ATP INDEX

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Sabreliner Corp.
NA-265 Series
Structural Repair Manual

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MFG.

INTRO

Report No. NA-66-1032

Sabreliner Structural Repair Manual

ALL MODELS NA 265 AIRCRAFT

ORIGINAL ISSUE: 1 JAN 1967
REVISED: 16 MAR 1990 — REVISION NO. 10

Sabreliner®
CORPORATION

RECORD OF REVISIONS

MFG REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERTED BY
9	Intro., Chaps 51 thru 57	6/3/1988	7/26/1988	ATP/JLB
10	See Revision Notice Page	3/16/1990	3/28/1990	ATP/JLB

REVISION LOG

Manual Control No: ______________________ Assigned To: ______________________

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REV. NO.	Basic/ Rev. Date	Insertion Date	Inserted By (Initial)	Remarks
0	Jan 1/67			Basic Issue Date
1	Jul 18/74			
2	Sep 25/75			
3	Feb 27/77			
4	Nov 25/77			
5	Nov 22/78			
6	Aug 14/81			
7	Apr 15/82			
8	Aug 17/84			Complete Reissue
9	June 3/88			Chaps. 51 thru 57
10	Mar 16/90			Chaps. 6 thru 78

RECORD OF TEMPORARY REVISIONS

TEMP REV NO	DESCRIPTION	ISSUE DATE	ATP REV DATE	INSERT BY	DATE REMOVED	REV INCOR	REMOVE BY
9/29/00	51-30-00:6A (SIL 57)	9/29/00	3/15/01	ATP/IB			

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Manual Control No: ______________________ Assigned To: ______________________

Manual Located At: ______________________

Temporary Rev. No.	Insertion Date	Inserted By (Initial)	Remarks
TR 89-1			
AUG. 15, '89	SEPT. 26/89	JLB	INCORPORATED INTO REVISION 10
SEP 29/00	03/15/01	ATP/IB	

NEW

IMPORTANT

READ THIS NOTICE ! ! !

REVISION NOTICE

16 MARCH 1990

SABRELINER STRUCTURAL REPAIR MANUAL

ALL MODELS NA 265 AIRCRAFT

REVISION INSTRUCTIONS

This is the latest Revision dated 16 March 1990, Revision No. 10 to your Sabreliner Structural Repair Manual, Report No. NA-66-1032. Insert latest revised pages, remove and destroy superseded pages.

This is a general revision to the manual affecting the following chapters: Intro., and 6 thru 78. Specific to this revision is the following:

1. Incorporation of TR 89-1.
2. L.E.P. update (new format).
3. Revised landing gear shock struts procedure.
4. Addition of Batts repair.
5. Acres Fastener Sleeves — addition of kit numbers.
6. Revised sealants table.
7. Addition of new main entrance door repair.
8. Revised elevator balance procedure.
9. Revised damage limits for windshields and windows.
10. Addition of overwing fairing delamination limits.
11. Addition of flaps sonic doublers repair.

When revising your manual, the List of Effective Pages appearing in the front of the manual should be used as a cross reference for removing obsolete pages and inserting the new and/or revised material. This ensures that only the latest material remains in the manual.

FRONTAL

LIST OF EFFECTIVE PAGES

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER LISTING

* The asterisk indicates chapters revised, added, or deleted by the current revision.

INTRODUCTION

TABLE OF CONTENTS

INTRODUCTION

LIST OF EFFECTIVE PAGES

* The asterisk indicates pages revised, added, or deleted by the current revision.

INTRODUCTION

GENERAL

The function of this structural repair manual is to acquaint maintenance personnel with the approved structural repairs of the SABRELINER and to direct them in the proper procedures for maintaining the airplane in an airworthy condition. Only the installations made in the airplane during manufacture have been reflected in this manual. Changes made after delivery from the manufacturer are not included. The ability of maintenance personnel is recognized, and those procedures which are considered common to all aircraft have been briefly referenced or omitted.

This manual provides coverage for the following models:

NA 265-40;	S/N 282-1 and Subs	(Includes airplanes modified by STC SA1674CE)
NA 265-60;	S/N 306-1 and Subs	(Includes airplanes modified by STC SA687NW)
NA 265-65;	S/N 465-1 and Subs	
NA 265-70;	S/N 370-2 thru -6, -8, and -9	
NA 265-80;	S/N 370-1 and -7, and 380-1 and Subs	(Includes airplanes modified by STC SA847NW)

This manual is to be used in conjunction with the applicable maintenance manual.

FORMAT

This manual has been prepared in accordance with Air Transport Association (ATA) Specification No. 100 to guide the repairman in the inspection and repair of Sabreliner Airplanes.

REPAIRS

Chapter 51 covers repairs that are common to more than one airframe structural group. These repairs are arbitrarily classified as "typical" and "general" in that different approaches were taken in their concept and must be taken in their execution. The typical repair portion of the chapter provides that data necessary for the repairman to develop his own repairs. The general repair portion of the chapter covers repairs in a conventional manner; that is, all data necessary to the repair is contained within the repair illustration, with the exception of references to materials and processes.

Repair coverage in Chapters 32, 52 thru 57, and 78 is found in the repair indexes for each chapter. These indexes consist of a master group repair index, and component repair indexes as applicable. Repair indexes give the SABRELINER drawing number, descriptive nomenclature, material data, and figure number(s) for each item illustrated.

LIST OF EFFECTIVE PAGES

A list of effective pages is provided with each chapter. It is an inventory of the pages in each chapter with the latest revision date for each page.

TABLE OF CONTENTS

The manual contains a general table of contents listing all the chapters in the manual; in addition, each chapter is prefaced with a table of contents identifying the subject matter within the chapter in the order of presentation. The table of contents is arranged with the following headings: DESCRIPTION, or STRUCTURAL IDENTIFICATION, NEGLIGIBLE DAMAGE, and REPAIRS.

LIST OF ILLUSTRATIONS

Each chapter is prefaced with a List of Illustrations identifying the subject in the order of presentation.

LIST OF TABLES

As applicable, the chapter is prefaced with a List of Tables identifying the subject in the order of presentation.

PART NUMBERS

This manual must not be used for identifying spare parts by number. Consult the SABRELINER Illustrated Parts Catalog for this information. Part numbers are used in this manual only as a means of identification when the nomenclature alone is inadequate. The numbers are often not complete. Dash numbers are used only when required because of material, gauge, or geometric differences.

REVISIONS

The "LIST OF EFFECTIVE PAGES" with each chapter serves as a tool for maintaining the manual. The "LIST OF EFFECTIVE PAGES" will be revised whenever the material in the affected chapter is revised. When revision pages are received, the list should be used as a cross reference for inserting the new/revised material and deleting obsolete material. This ensures that all obsolete material is destroyed and the manual is kept current. Revisions to the text are indicated by change bars (vertical lines) in the margin adjacent to the revised material. Revisions to illustrations may be indicated by change bars, zip-a-tone shading on electrical schematics, and pointing fingers on mechanical, hydraulic, and pneumatic diagrams.

A "REVISION LOG" page is provided for recording revisions by revision date and the dates they were inserted in the manual.

A "TEMPORARY REVISION LOG" page is provided for recording Temporary Revisions (yellow sheets) by revision number, issue date, and the dates they were inserted in the manual.

INTRODUCTION (Cont'd)

NON-SABRELINER APPROVED PARTS

WARNING

Only Sabreliner parts or Sabreliner approved parts obtained from approved sources are to be used in connection with the maintenance and repair of Sabreliner airplanes.

Genuine Sabreliner parts are manufactured and inspected under rigorous procedures in accordance with a Production Certificate (PC) to insure airworthiness and suitability for use in Sabreliner aircraft application. Parts purchased from sources other than Sabreliner, or its approved vendors, may not have the required tests and inspections performed and may be different in fabrication techniques and materials. A non-approved part may seriously compromise the safety of the aircraft.

Government surplus parts, salvaged airplane parts, reworked parts obtained from non-Sabreliner approved sources, or parts, components or structural assemblies which do not have proper documentation may have a service history which is unknown or cannot be authenticated. These parts may have been subjected to unacceptable stresses or temperatures or have hidden damage which is not discernible through routine visual or usual non-destructive testing techniques. This may render the part, component or structural assembly unsuitable and unsafe for aircraft use, even if such part, component or structural assembly were originally manufactured by Sabreliner or an approved source.

Sabreliner Corporation expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by the use of non-Sabreliner approved parts.

NOTE

Sabreliner Corporation expressly reserves the right to supersede, cancel and/or declare obsolete, without prior notice, any part, part number, kit or publication referenced in this manual.

CHAPTER

06

DIMENSIONS AND AREAS

CHAPTER 6

DIMENSIONS AND AREAS

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CHAPTER 6

DIMENSIONS AND AREAS

LIST OF ILLUSTRATIONS

CHAPTER 6

DIMENSIONS AND AREAS

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	20	Aug 17/84

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER 6

DIMENSIONS AND AREAS

AIRPLANE STATIONS AND MEASUREMENT SYSTEM

GENERAL

A brief outline of the airplane measurement system, (figure 1) is offered to assist the repairman in the use of the airplane station diagrams shown in figures 2 thru 18. Only those reference planes from which component stations originate are given.

FUSELAGE REFERENCE SYSTEMS

There are two principal reference planes in the fuselage from which all dimensions relative to the fuselage are taken: The fuselage vertical center plane, and the fuselage reference plane (horizonal). The fuselage vertical center plane divides the fuselage vertically and longitudinally. The fuselage reference plane divides the fuselage horizontally and longitudinally. The fuselage reference plane is approximately at the fuselage maximum cross section and is identifiable by two flush-head screws (painted red) on the right side of the fuselage.

On all Sabreliner airplanes these screws are located 2.375 in. below the fuselage reference plane at FS 142.375 and 443.125.

Fuselage stations are measured in increments of inches longitudinally along the fuselage reference plane. (See figures 8 thru 11.) All stations are normal (at right angles) to the fuselage reference plane unless otherwise noted. Canted station locations are determined by where the canted station intersects (or would intersect if extended) the fuselage reference plane. All stations are numbered from station zero aft. Station zero is the forwardmost point of the fuselage. Any addition to the fuselage fwd of station zero is considered a minus (negative) station and is indicated as such.

Buttock planes are longitudinal planes parallel to the fuselage vertical center plane. Positive (plus) buttock planes are to the left of the vertical center plane; negative (minus) buttock planes are to the right of the vertical center plane.

Water planes are longitudinal planes parallel to the fuselage reference plane. All water planes above the fuselage reference plane are positive (plus); the water planes below the fuselage reference plane are negative (minus) water planes.

By use of the three reference systems discussed, any point on or within the fuselage may be located. The station lines furnish the longitudinal dimensions. The buttock planes indicate horizontal dimensions outbd from the vertical center plane; the water planes provide vertical dimensions above or below the fuselage reference plane.

WING REFERENCE SYSTEMS

Several reference systems are used to describe the wing and its various components. The wing reference plane is an arbitrary plane across the wing cord plane from which vertical dimensions are taken. Fore and aft dimensions are taken from the 41.3 % element or plane. Wing stations are normal to, or canted from the 41.3% element. Canted wing stations are designated by where the canted station intersects (or would intersect if extended) the 41.3% element. Dimensions for determining the 41.3% element are given in the figures as follows for:

Model NA 265-40, -60, -70, and -80 - (See figure 12.)
Model NA 265-60A, -60SC, -65, -80A, and -80SC - (See figure 13.)

After the 41.3% element of the wing is established from the dimensions given, any point on the wing can be located. The point most easily defined is the machined land for the wing tip attachment, located at the outbd end of the machined skin. This point is wing station 293.158. The distance is measured from the point in question to the machined land. This dimension is subtracted from the known point (293.317). The result is the wing station of the desired point.

On Model NA 265-40, -60, -70, and -80, the slat stations are normal to the slat hinge plane. Canted slat stations are designated by where the canted station intersects (or would intersect if extended) the slat hinge plane. Dimensions for locating the slat hinge plane are given in figure 14.

On Model NA 265-40, -60, -70, and -80, the centerline of the flap hinge is the reference plane from which the flap stations are designated. Flap stations are normal to this plane unless canted. Canted flap stations are designated by where the canted station intersects (or would intersect if extended) the flap hinge plane. Dimensions for locating the flap station are given in figure 14.

On Model NA 265-60A, -60SC, -65, -80A, and -80SC, all flap stations are normal to the flap leading edge plane with the exception of the canted flap stations. Canted flap stations are referenced from the point where the canted station intersects (or would intersect if extended) the flap leading edge plane.

AIRPLANE STATIONS AND MEASUREMENT SYSTEM (Continued)

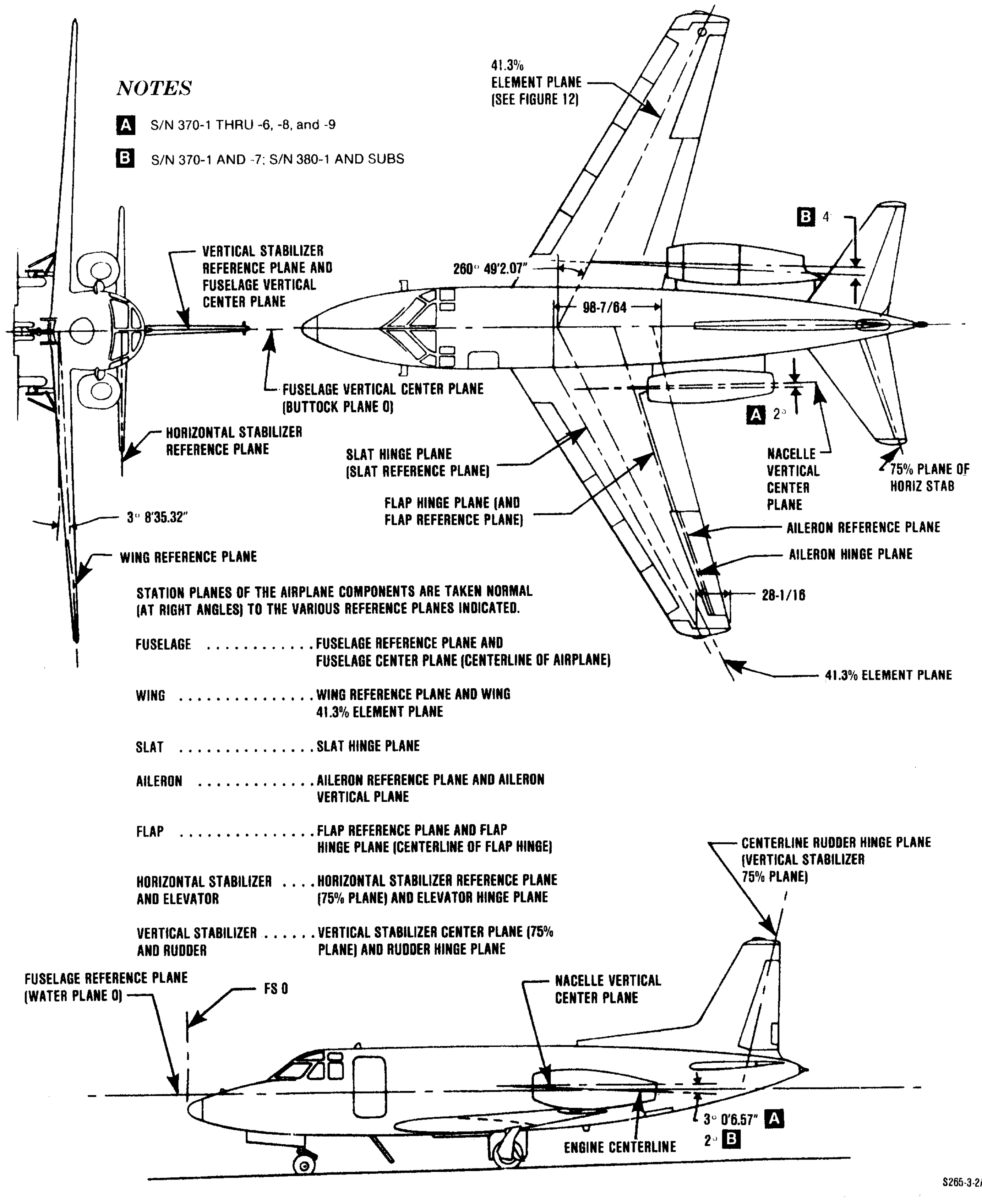
WING REFERENCE SYSTEMS (Cont'd)

For all practical purposes, the aileron hinge plane can be used to identify aileron stations. Although the aileron reference plane and the aileron hinge plane are not absolutely parallel, there is such a slight difference between the two planes that for field measurements, the aileron hinge centerline plane should be entirely satisfactory. All aileron stations can be considered normal to the aileron hinge plane except those stations which are canted. Canted aileron stations are designated by where the canted station intersects (or would intersect if extended) the aileron hinge plane. (See applicable figure 14 or 15.)

EMPENNAGE REFERENCE SYSTEM

Vertical stabilizer and rudder stations are both designated from the rudder hinge plane, which is also the vertical stabilizer 75% plane. Station lines of both the vertical stabilizer and the rudder are designated from the 75% plane of the vertical stabilizer and are normal to it. All canted stations of the vertical stabilizer and the rudder are designated from the vertical stabilizer 75% plane.

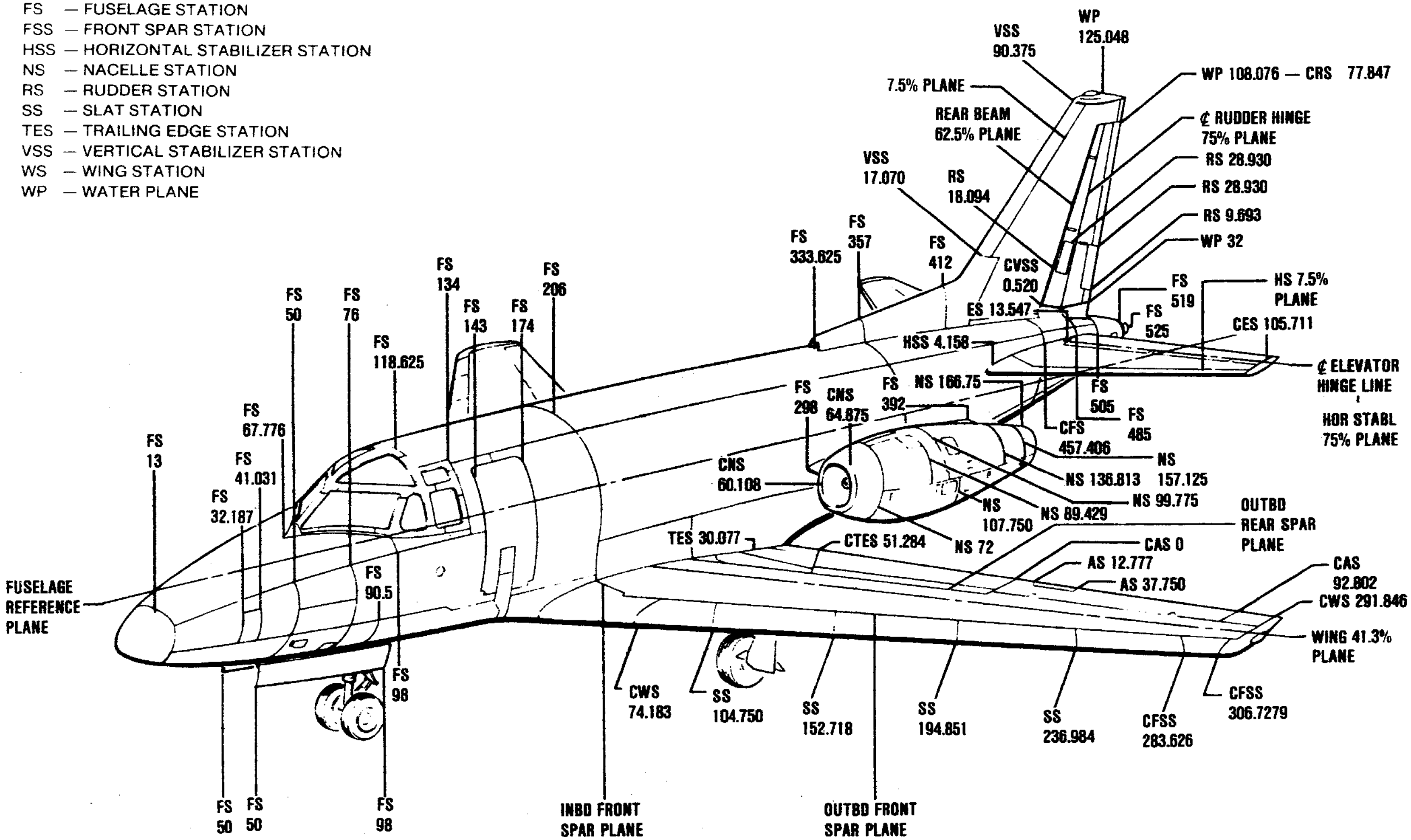
Horizontal stabilizers and elevator stations are normal to, and designated from, the 75% plane of horizontal stabilizer. This plane is identical to the elevator hinge plane. Canted stations of both the horizontal stabilizer and the rudder are designated from where they intersect (or would intersect if extended) the 75% plane of the horizontal stabilizer. (For station locations, see figures 16 thru 18.)



Airplane Fuselage Measurement System
Figure 1

ABBREVIATIONS

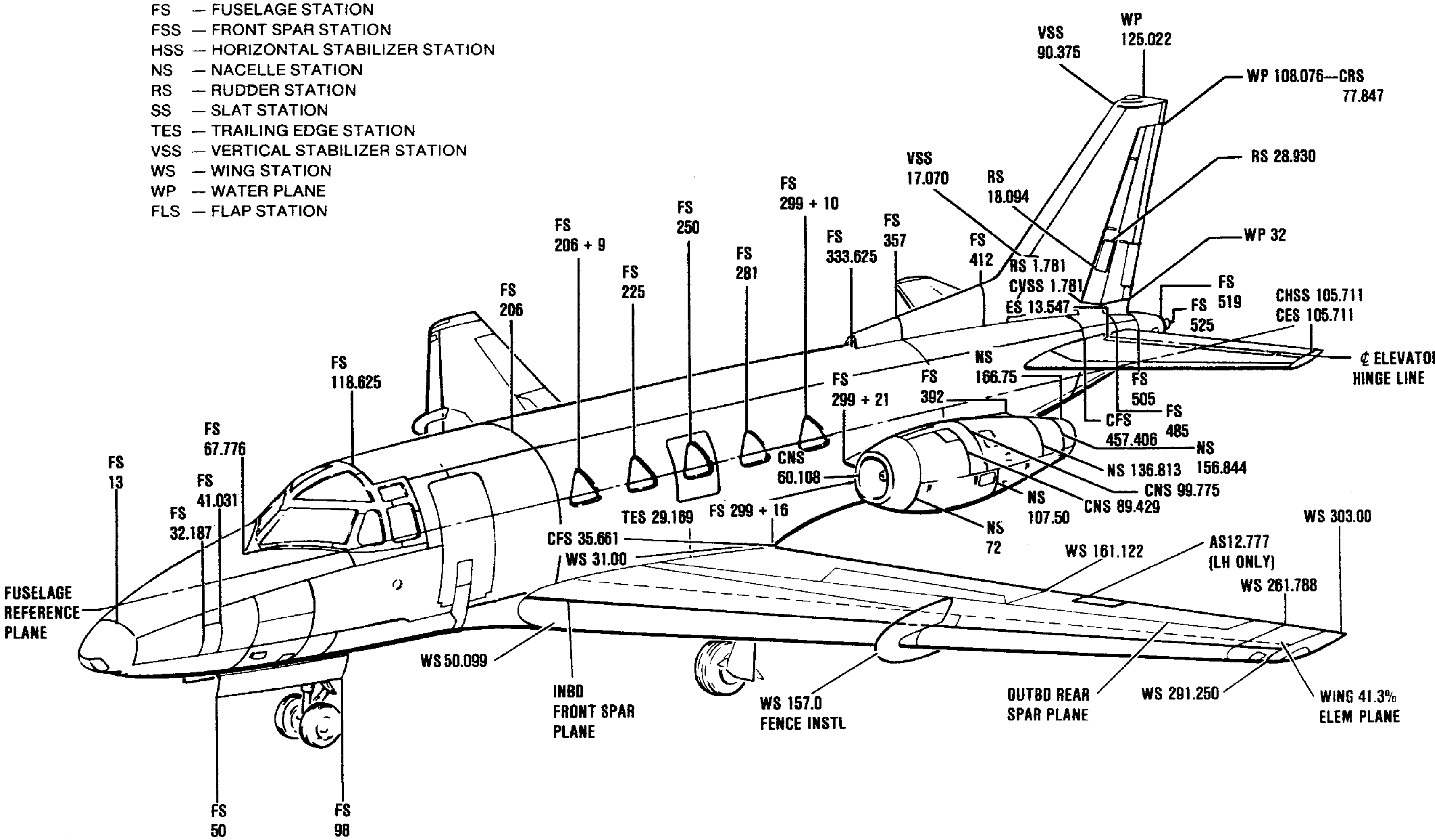
C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
ES — ELEVATOR STATION
FS — FUSELAGE STATION
FSS — FRONT SPAR STATION
HSS — HORIZONTAL STABILIZER STATION
NS — NACELLE STATION
RS — RUDDER STATION
SS — SLAT STATION
TES — TRAILING EDGE STATION
VSS — VERTICAL STABILIZER STATION
WS — WING STATION
WP — WATER PLANE



Airplane Station Diagram
Model NA 265-40 and -60
Figure 2

ABBREVIATIONS

C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
ES — ELEVATOR STATION
FS — FUSELAGE STATION
FSS — FRONT SPAR STATION
HSS — HORIZONTAL STABILIZER STATION
NS — NACELLE STATION
RS — RUDDER STATION
SS — SLAT STATION
TES — TRAILING EDGE STATION
VSS — VERTICAL STABILIZER STATION
WS — WING STATION
WP — WATER PLANE
FLS — FLAP STATION

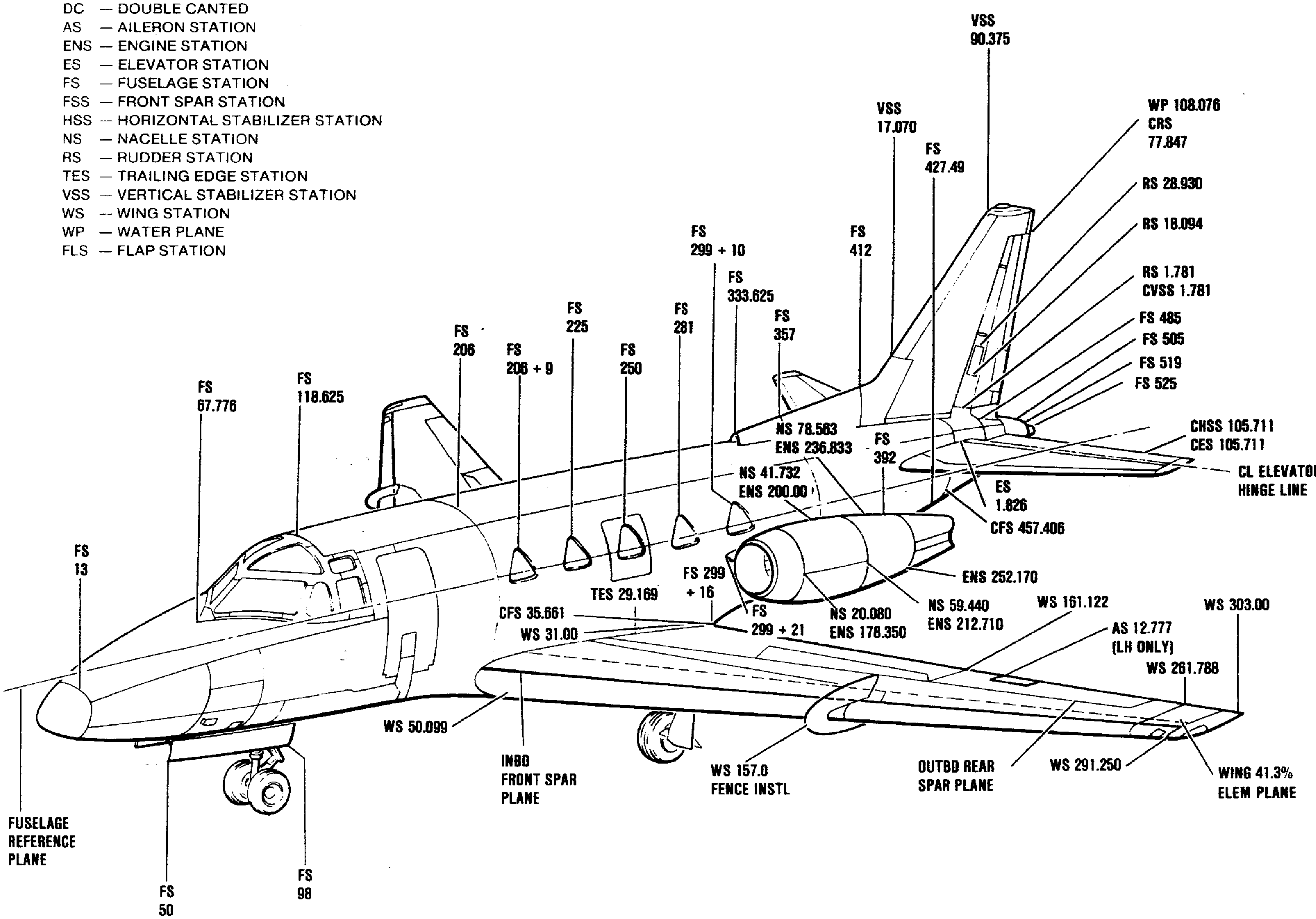


Airplane Station Diagram
Model NA 265-60A and -60 SC
Figure 3

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465-2-00 23

ABBREVIATIONS

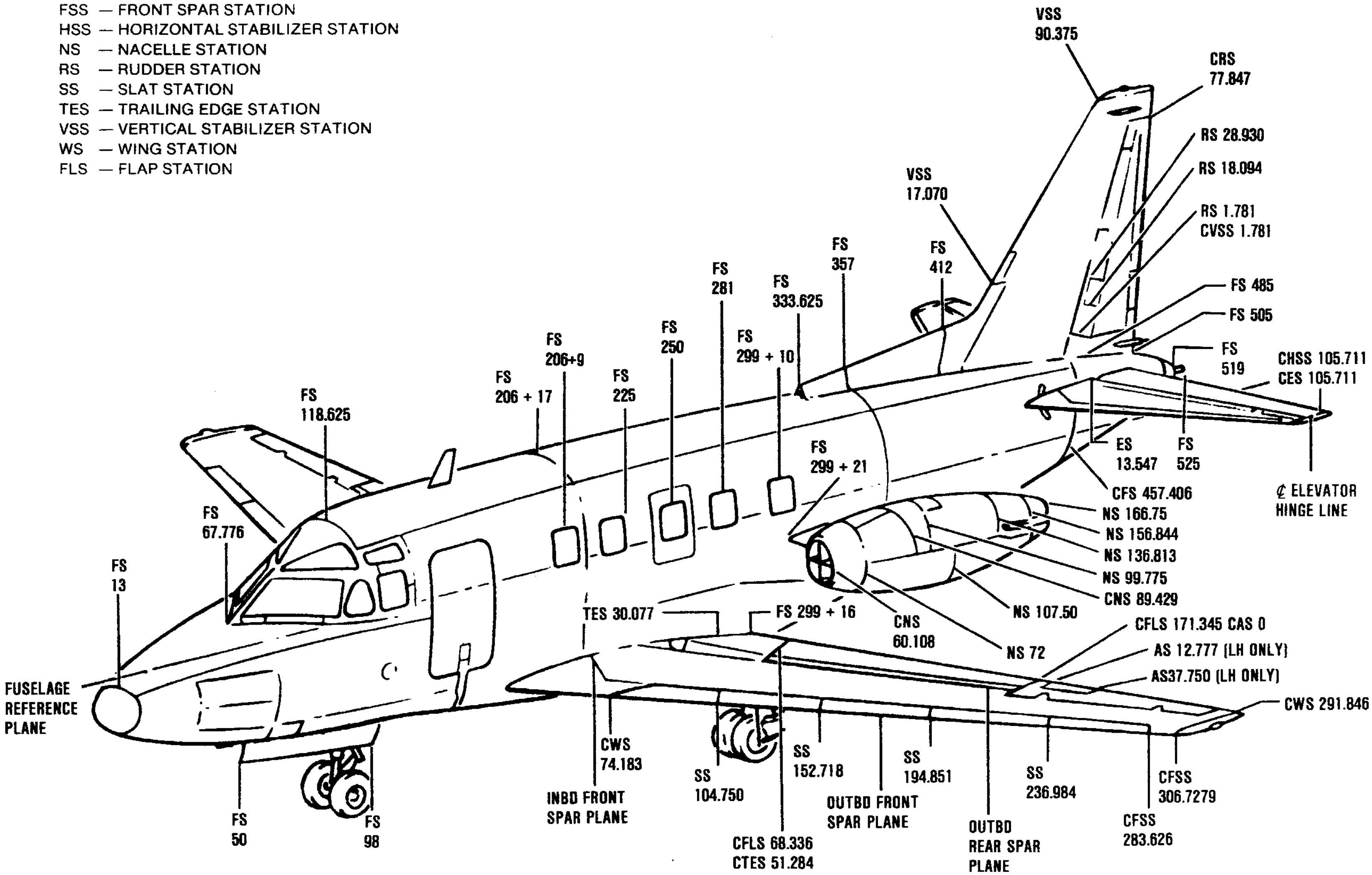
C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
ENS — ENGINE STATION
ES — ELEVATOR STATION
FS — FUSELAGE STATION
FSS — FRONT SPAR STATION
HSS — HORIZONTAL STABILIZER STATION
NS — NACELLE STATION
RS — RUDDER STATION
TES — TRAILING EDGE STATION
VSS — VERTICAL STABILIZER STATION
WS — WING STATION
WP — WATER PLANE
FLS — FLAP STATION



Airplane Station Diagram
Model NA 265-65
Figure 4

ABBREVIATIONS

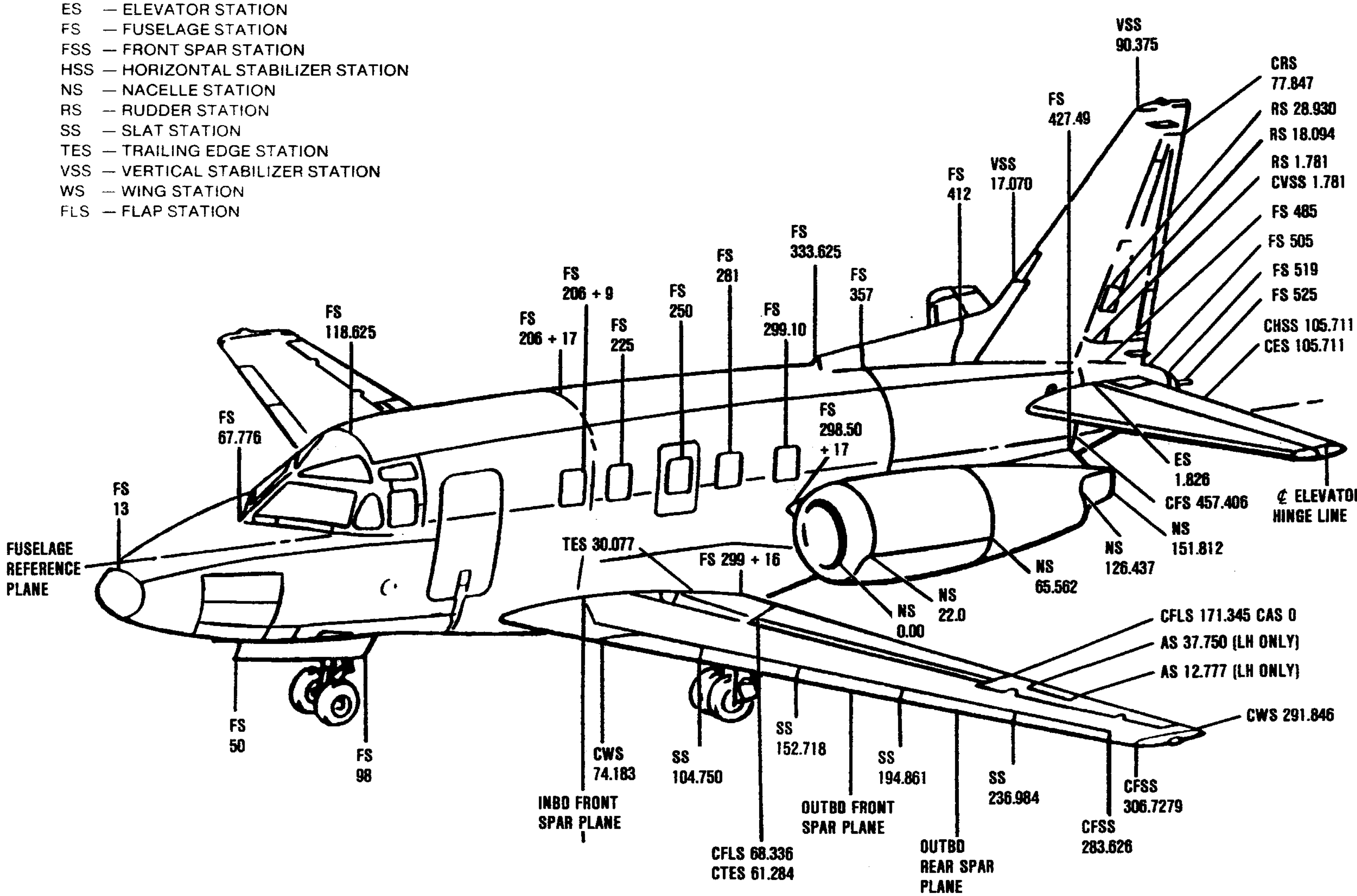
C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
ES — ELEVATOR STATION
FS — FUSELAGE STATION
FSS — FRONT SPAR STATION
HSS — HORIZONTAL STABILIZER STATION
NS — NACELLE STATION
RS — RUDDER STATION
SS — SLAT STATION
TES — TRAILING EDGE STATION
VSS — VERTICAL STABILIZER STATION
WS — WING STATION
FLS — FLAP STATION



Airplane Station Diagram
Model NA 265-70 (S/N 370-2 thru -6, -8, and -9)
Figure 5

ABBREVIATIONS

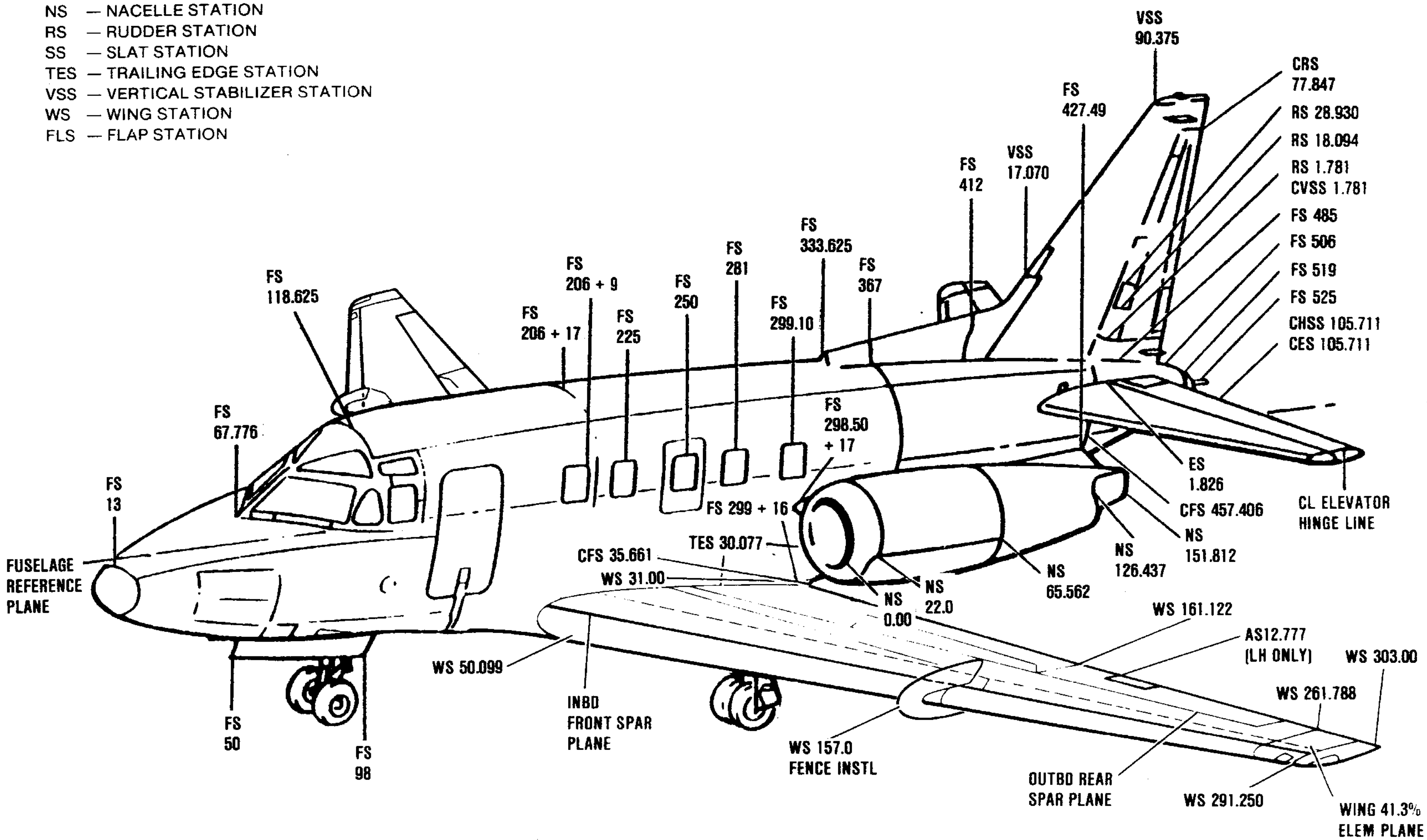
C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
ES — ELEVATOR STATION
FS — FUSELAGE STATION
FSS — FRONT SPAR STATION
HSS — HORIZONTAL STABILIZER STATION
NS — NACELLE STATION
RS — RUDDER STATION
SS — SLAT STATION
TES — TRAILING EDGE STATION
VSS — VERTICAL STABILIZER STATION
WS — WING STATION
FLS — FLAP STATION



Airplane Station Diagram
Model NA 265-70 (S/N 370-1 and -7); also -80
Figure 6

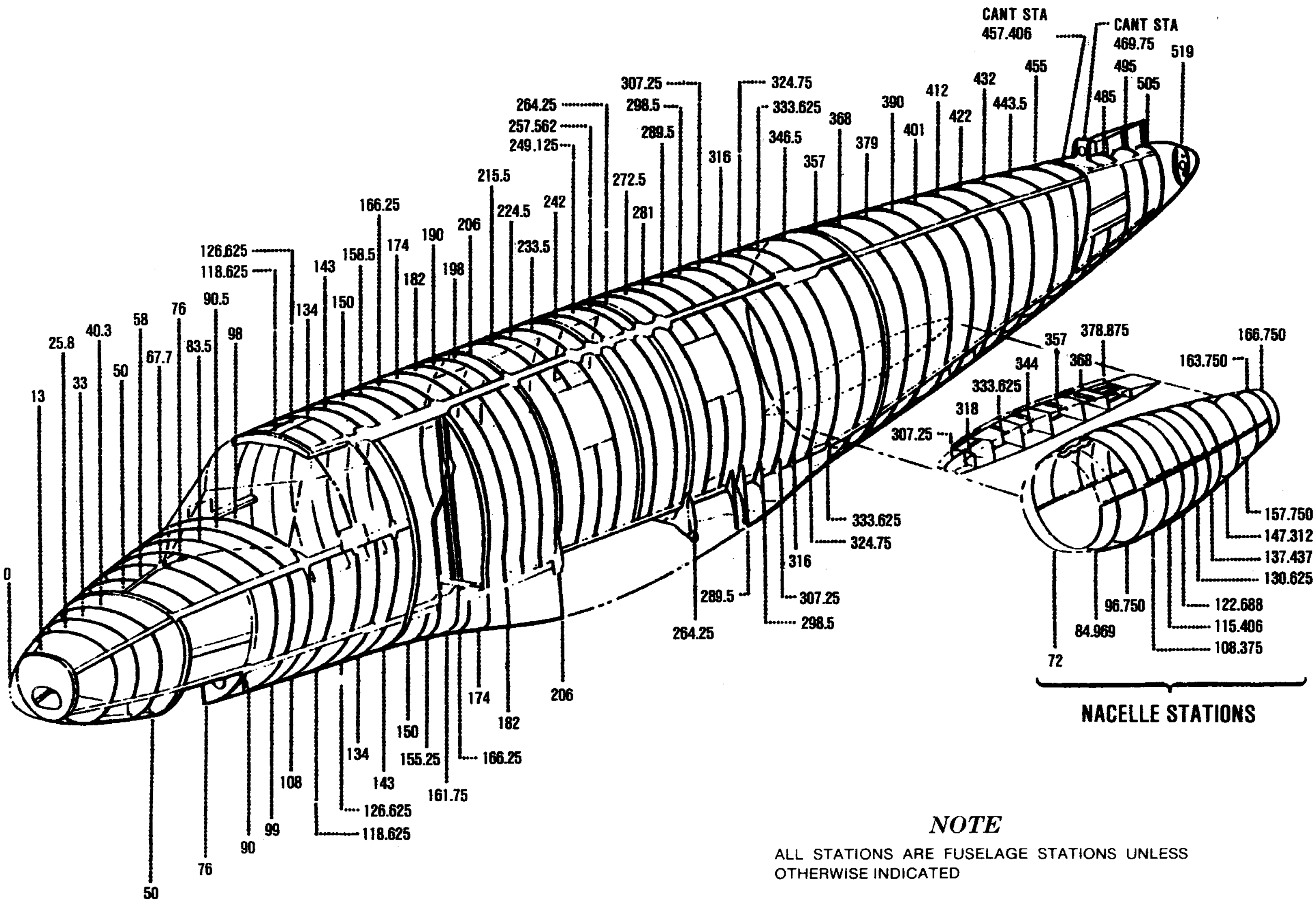
ABBREVIATIONS

C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
ES — ELEVATOR STATION
FS — FUSELAGE STATION
FSS — FRONT SPAR STATION
HSS — HORIZONTAL STABILIZER STATION
NS — NACELLE STATION
RS — RUDDER STATION
SS — SLAT STATION
TES — TRAILING EDGE STATION
VSS — VERTICAL STABILIZER STATION
WS — WING STATION
FLS — FLAP STATION



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Airplane Station Diagram
Model NA 265-80A and -80SC
Figure 7

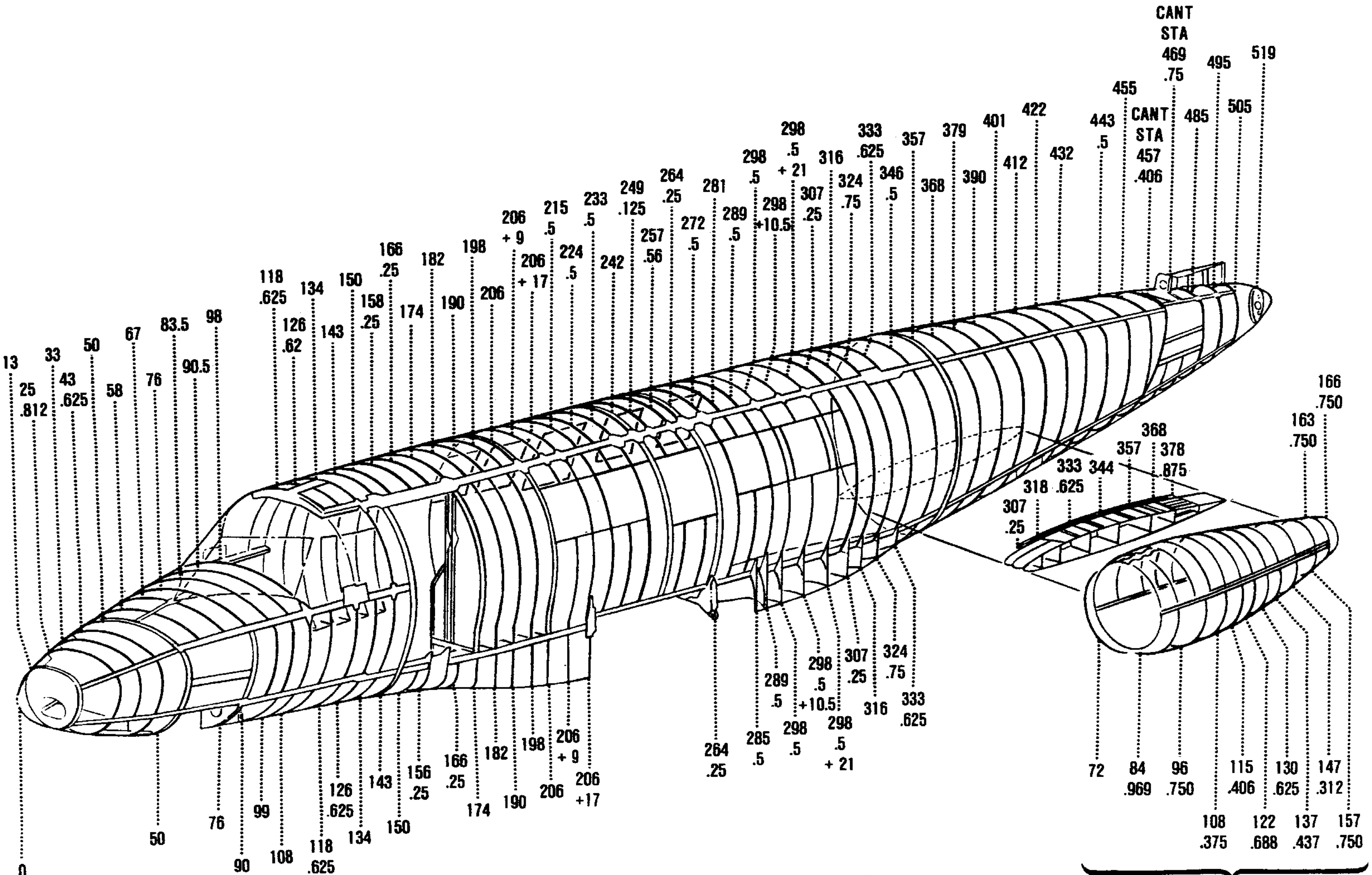


NOTE

ALL STATIONS ARE FUSELAGE STATIONS UNLESS OTHERWISE INDICATED

Airplane Fuselage Station Diagram
Model NA 265-40
Figure 8

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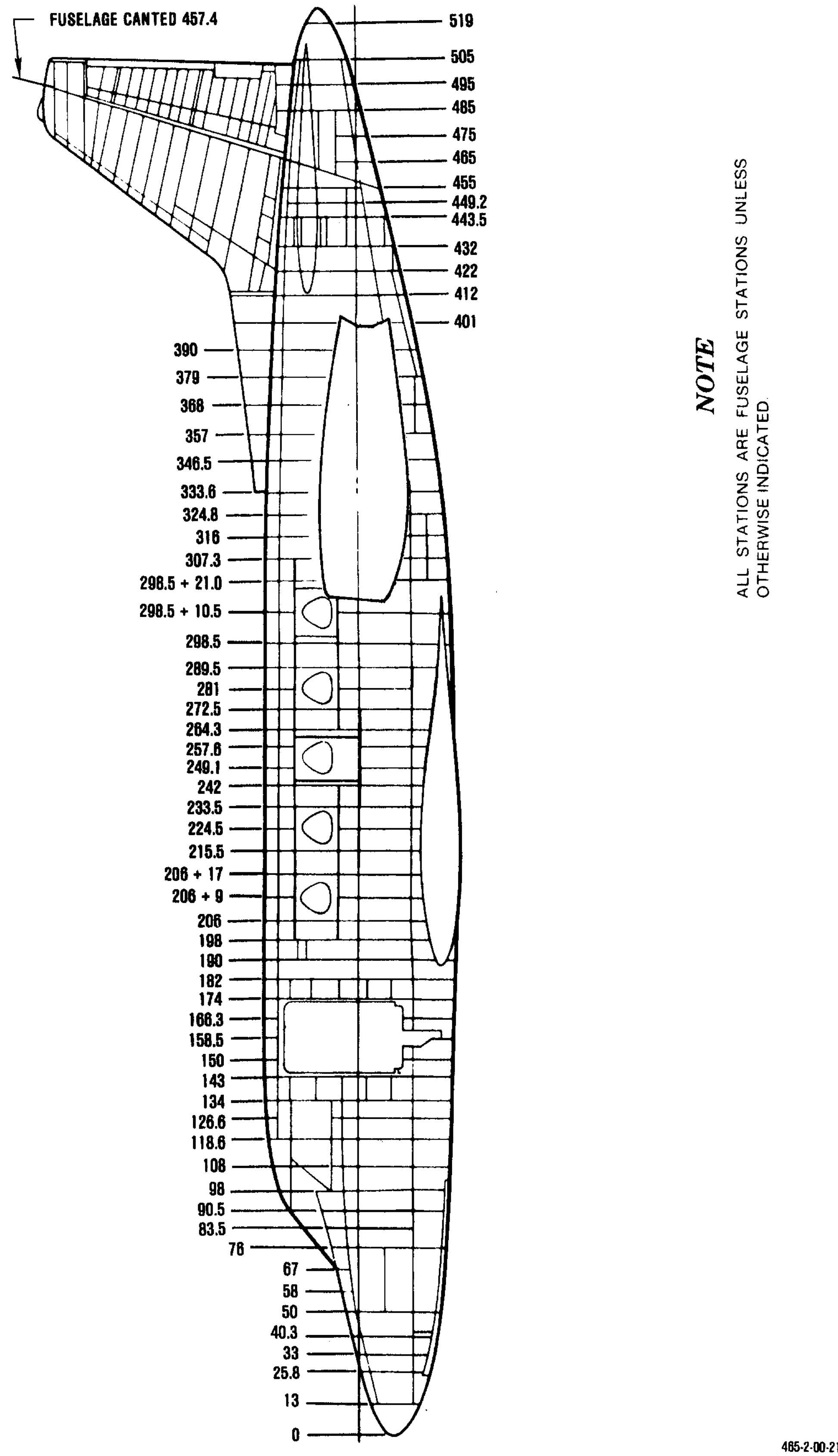


NOTE

ALL STATIONS ARE FUSELAGE STATIONS UNLESS OTHERWISE INDICATED.

Airplane Fuselage Station Diagram
Model NA 265-60, -60A, and -60SC
Figure 9

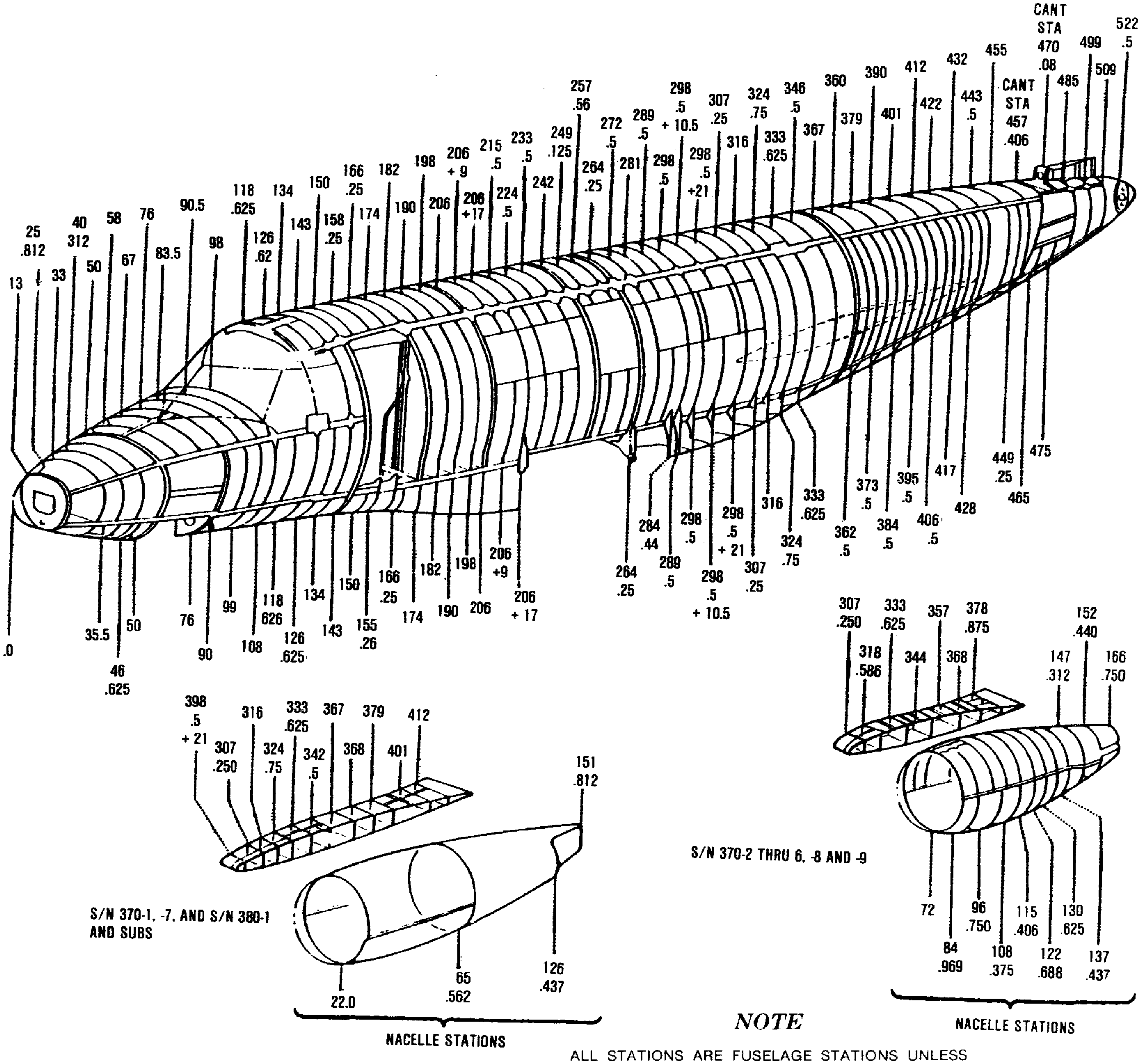
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NOTE

ALL STATIONS ARE FUSELAGE STATIONS UNLESS OTHERWISE INDICATED.

Airplane Fuselage Station Diagram
Model NA 265-65
Figure 10

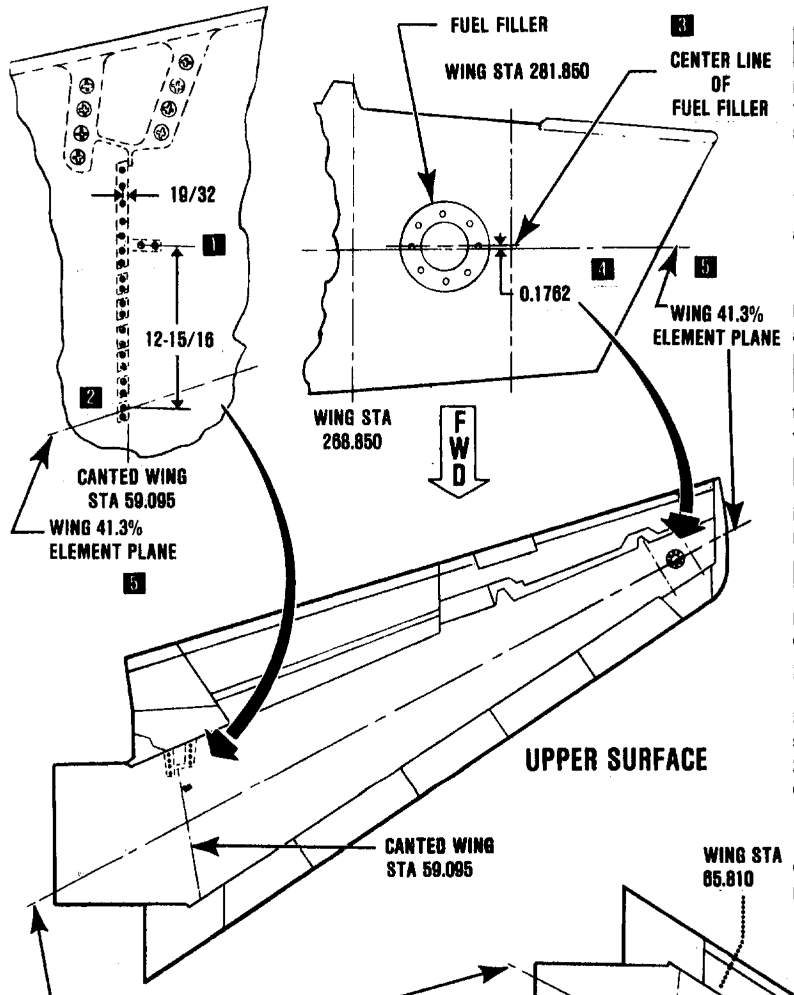


NOTE

ALL STATIONS ARE FUSELAGE STATIONS UNLESS OTHERWISE INDICATED.

Airplane Fuselage Station Diagram
Model NA 265-70, -80, -80A, and -80SC
Figure 11

S370 3-4



1 Establish the 41.3% element plane at an inbd point on wing, by drawing a line through centers of the two fasteners indicated, so that it intersects canted wing at station 59.095

2 From point established at station 59.095, measure 12-15/16 in. along station 59.095. This establishes the point at which the 41.3% element plane intersects station 59.095.

3 Establish the 41.3% element plane at outbd end of wing by drawing a line through center of fuel filler fasteners approximately parallel to the 41.3% element plane.

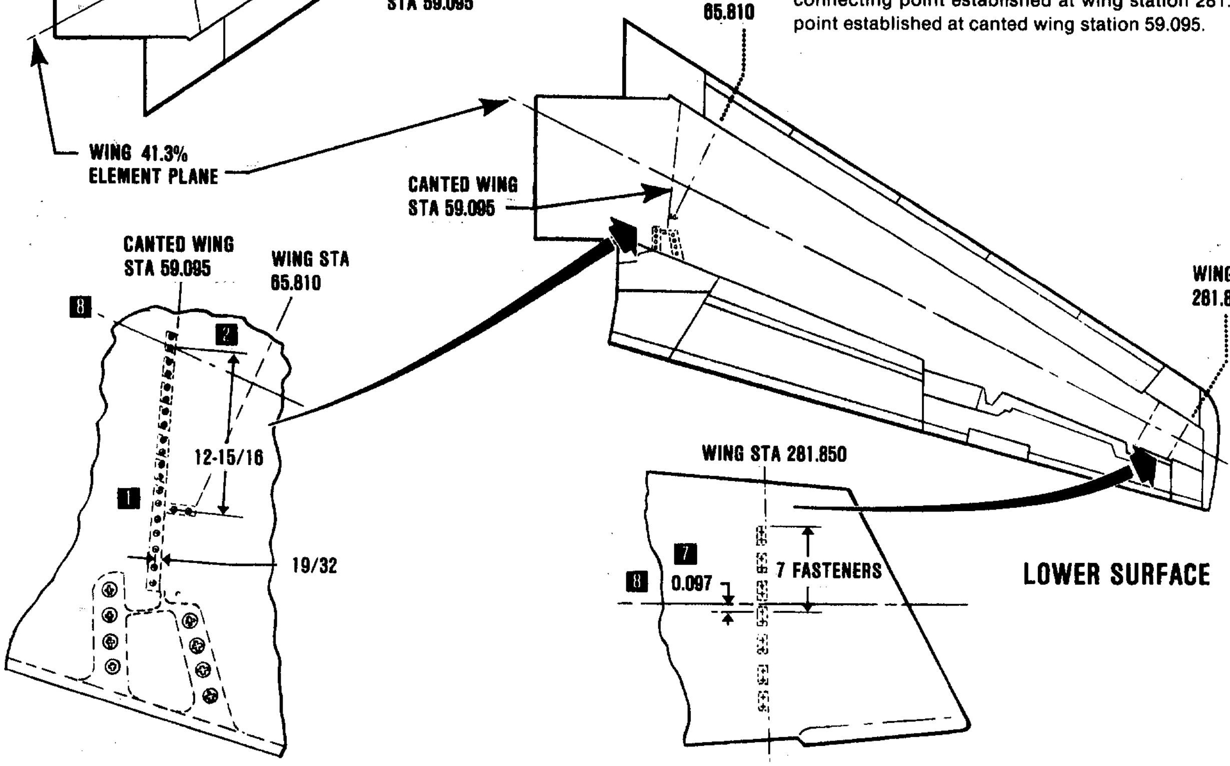
4 Measure fwd 0.1762 in. from line through center of fuel filler. This establishes the 41.3% element plane at the fuel filler.

5 Draw a line from the point established on fuel filler to inbd point established at canted wing station 59.095. This locates the 41.3% element plane along the entire wing.

6 Use the same method to locate the 41.3% element plane on inbd lower surface as is used to locate the 41.3% element plane on inbd upper surface.

7 Establish the 41.3% element plane at an outbd point on lower surface of wing by measuring 0.0977 in. fwd of the seventh from forward-most rib fastener at wing station 281.850. This establishes the point at which the 41.3% element plane intersects wing station 281.850.

8 Locate the 41.3% element plane along entire wing by connecting point established at wing station 281.850 and point established at canted wing station 59.095.



Airplane Wing Measurement System
Model NA 265-40, -60, -70, and -80
Figure 12

1 Establish the 41.3% element plane on the wing upper surface by drawing by a centerline on the closeout strip over canted wing station 59.095.

2 Extend centerline aft until it intersects with the centerline of the fastener row securing the wing upper skin to the rear spar.

3 From the intersection, measure 28.625 in. fwd along the closeout strip centerline. This establishes an inbd point for the 41.3% element plane.

4 Establish the 41.3% element plane at outbd end of wing by drawing a line through center of fuel filler fasteners approximately parallel to the 41.3% element plane.

5 Measure fwd 0.1762 in. from line through center of fuel filler. This establishes the 41.3% element plane at the fuel filler.

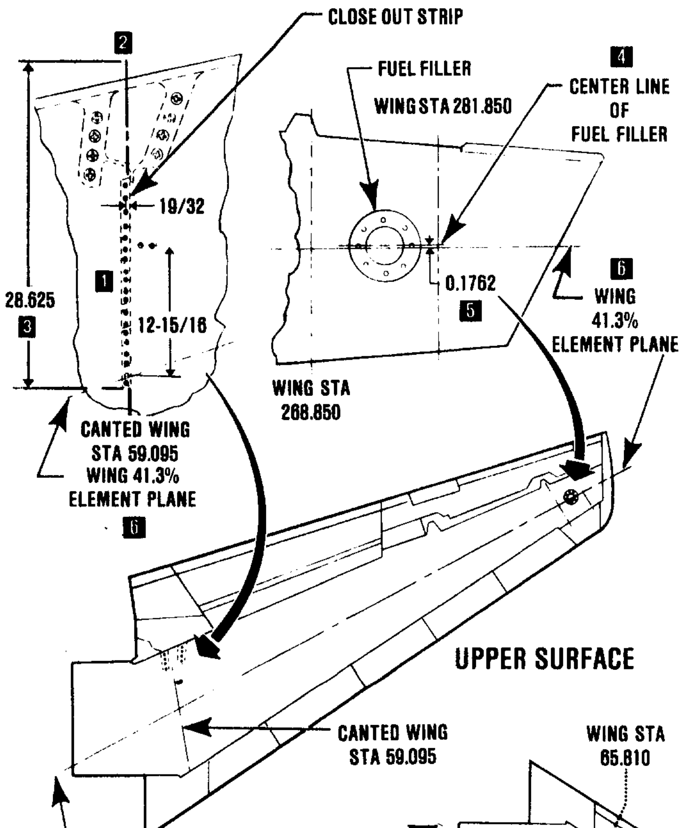
6 Draw a line from the point established on the fuel filler to the inbd point established on the closeout strip. This locates the 41.3% element plane along the entire wing upper surface.

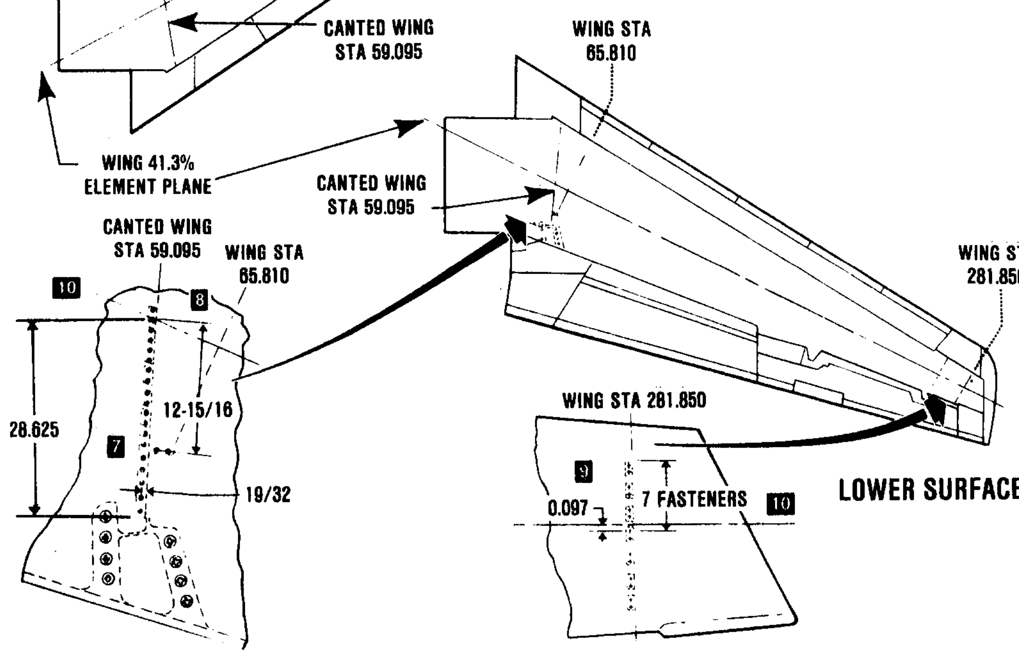
7 Establish the 41.3% element plane on the wing lower surface by drawing a line through the two fasteners indicated so that it intersects with canted wing station 59.095.

8 From point established at station 59.095, measure 12-15/16 in. along station 59.095. This establishes the point at which the 41.3% element plane intersects station 59.095.

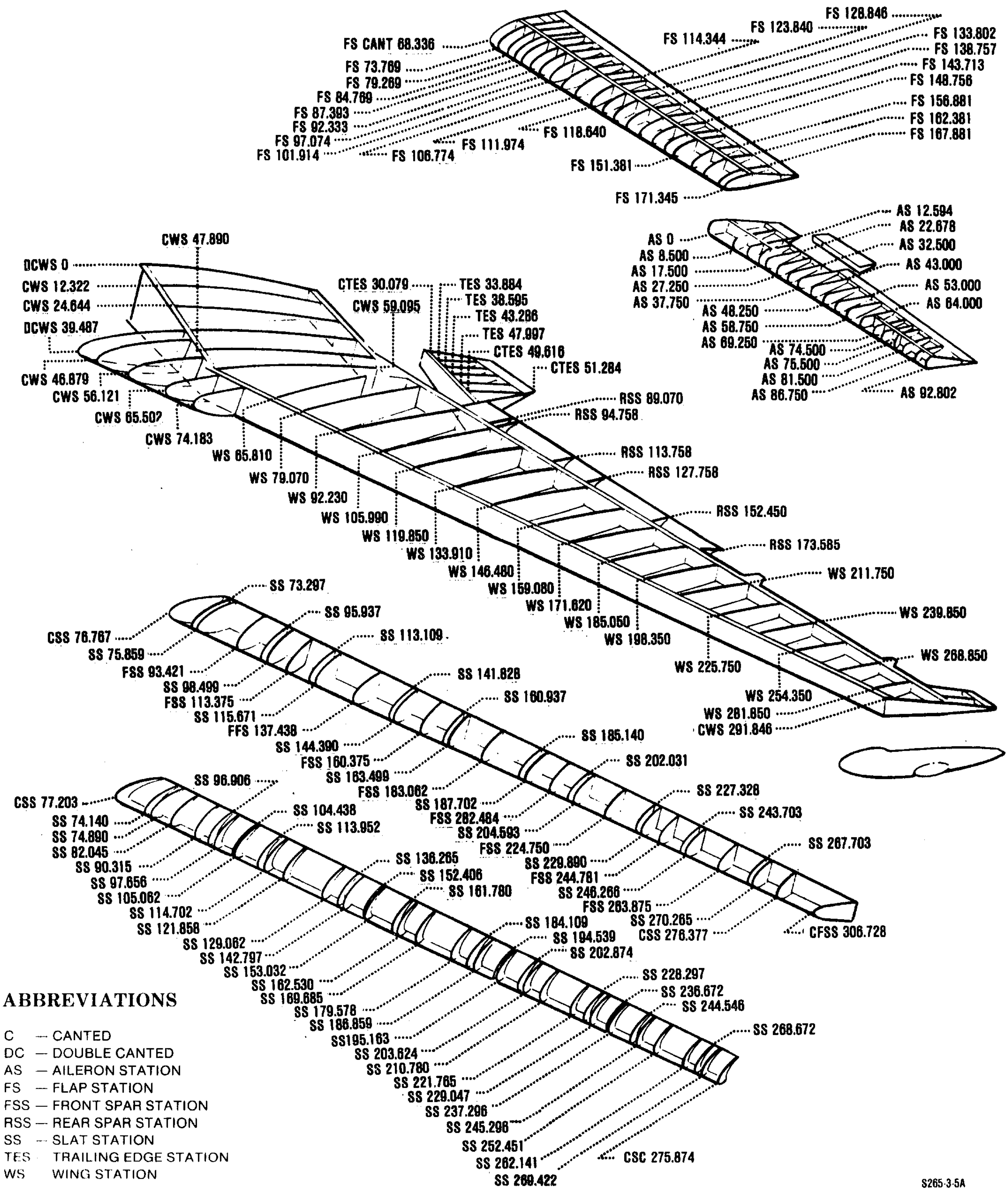
9 Establish the 41.3% element plane at an outbd point on lower surface of wing by measuring 0.0977 in. fwd of the seventh from forward-most rib fastener at wing station 281.850. The establishes the point at which the 41.3% element plane intersects wing station 281.850.

10 Locate the 41.3% element plane along entire wing by connecting point established at wing station 281.850 and point established at canted wing station 59.095.





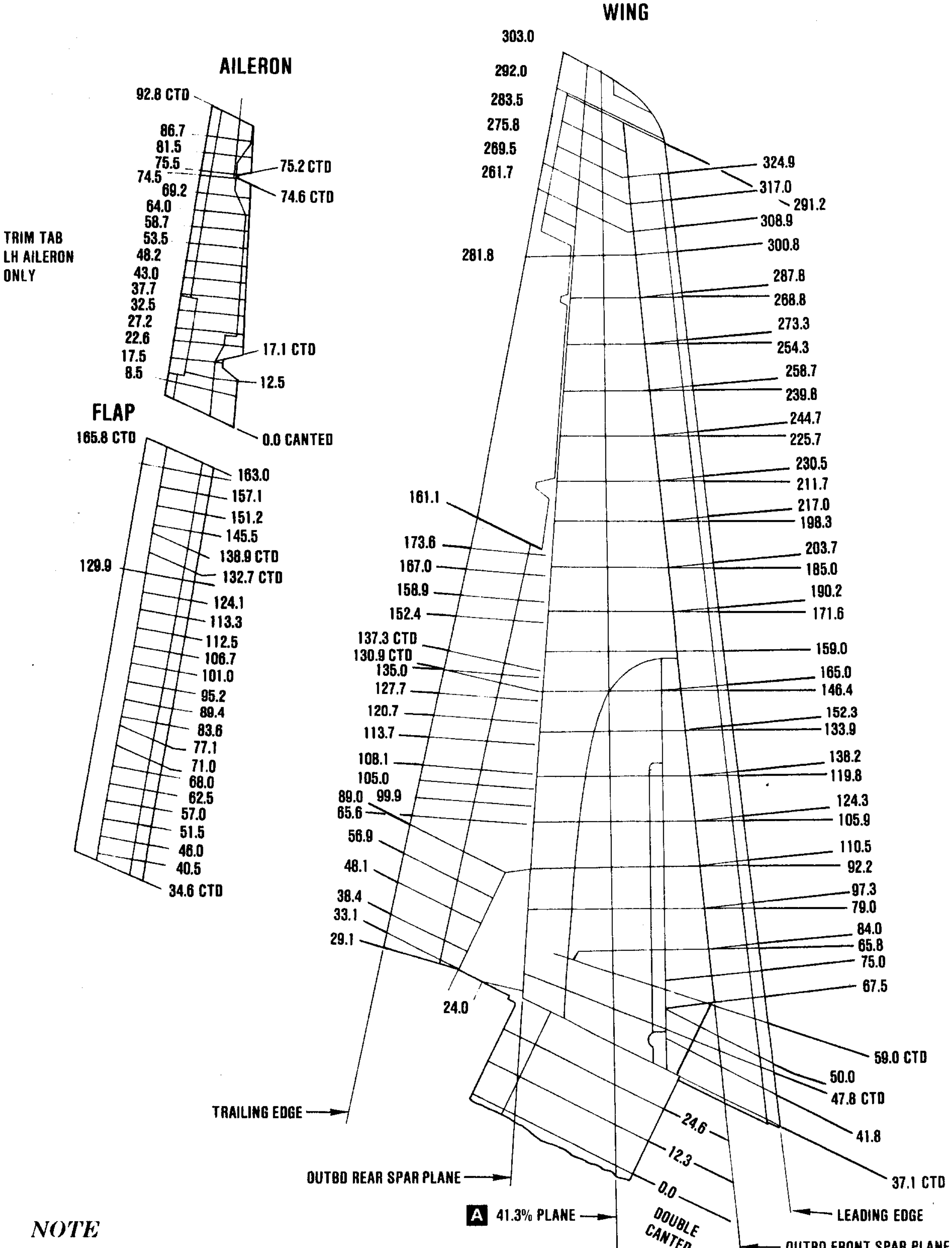
Airplane Wing Measurement System
Model NA 265-60A, -60SC, -65, -80A, and -80SC
Figure 13



ABBREVIATIONS

C — CANTED
DC — DOUBLE CANTED
AS — AILERON STATION
FS — FLAP STATION
FSS — FRONT SPAR STATION
RSS — REAR SPAR STATION
SS — SLAT STATION
TES — TRAILING EDGE STATION
WS — WING STATION

Airplane Wing Station Diagram
Model NA 265-40, -60, -70, and -80
Figure 14

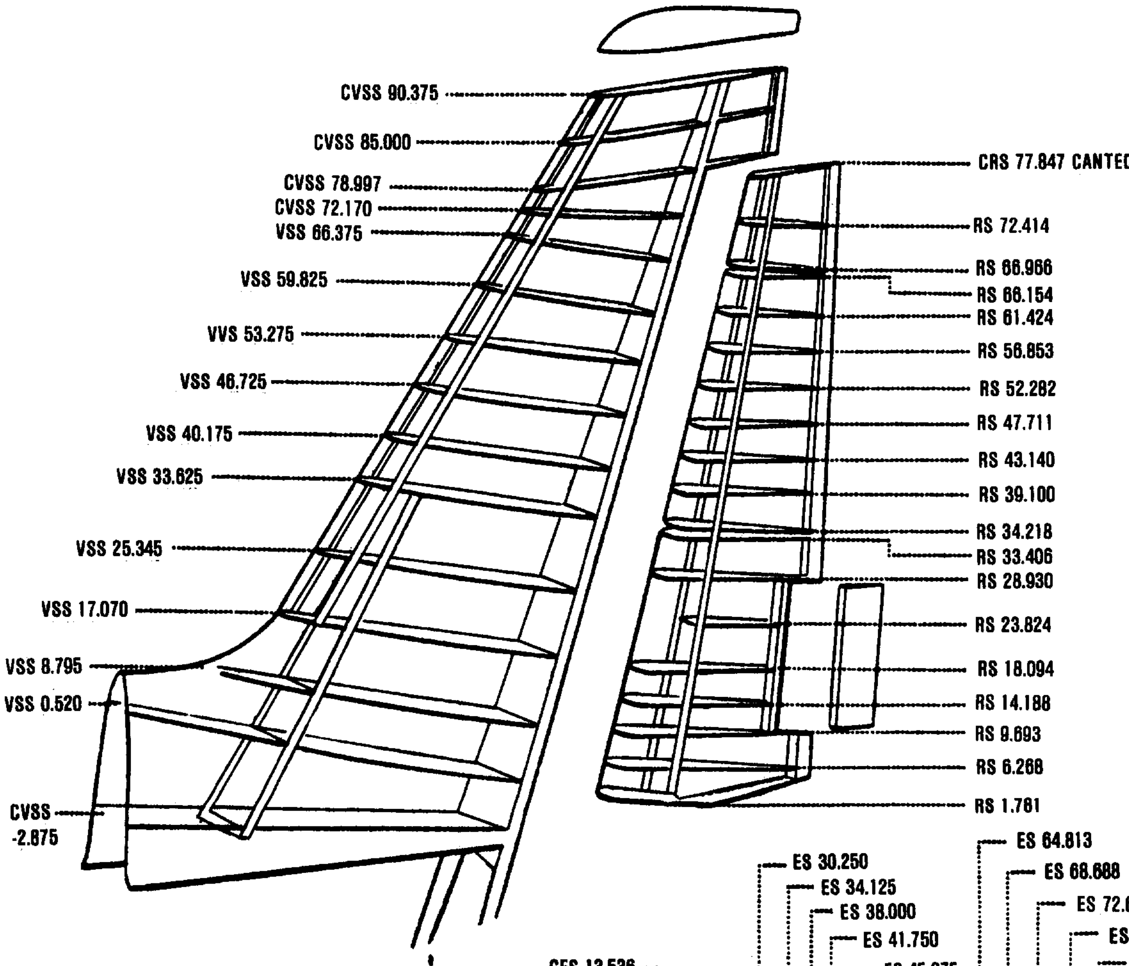


NOTE

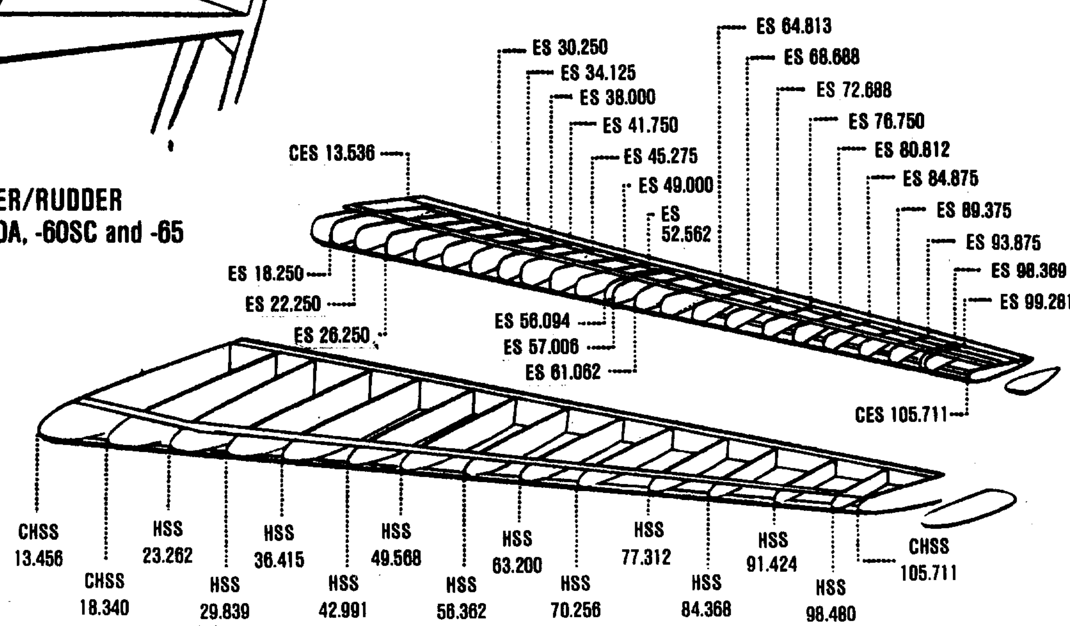
A ALL WING STATIONS ARE PERPENDICULAR TO 41.3% ELEMENT PLANE

465-2-00-22

Airplane Wing Station Diagram
Model NA 265-60A, -60SC, -65, -80A, and -80SC
Figure 15



VERTICAL STABILIZER/RUDDER
MODEL NA 265-40, -60, -60A, -60SC and -65



ABBREVIATIONS

C — CANTED
HSS — HORIZONTAL STABILIZER STATION
VSS — VERTICAL STABILIZER STATION
ES — ELEVATOR STATION
RS RUDDER STATION

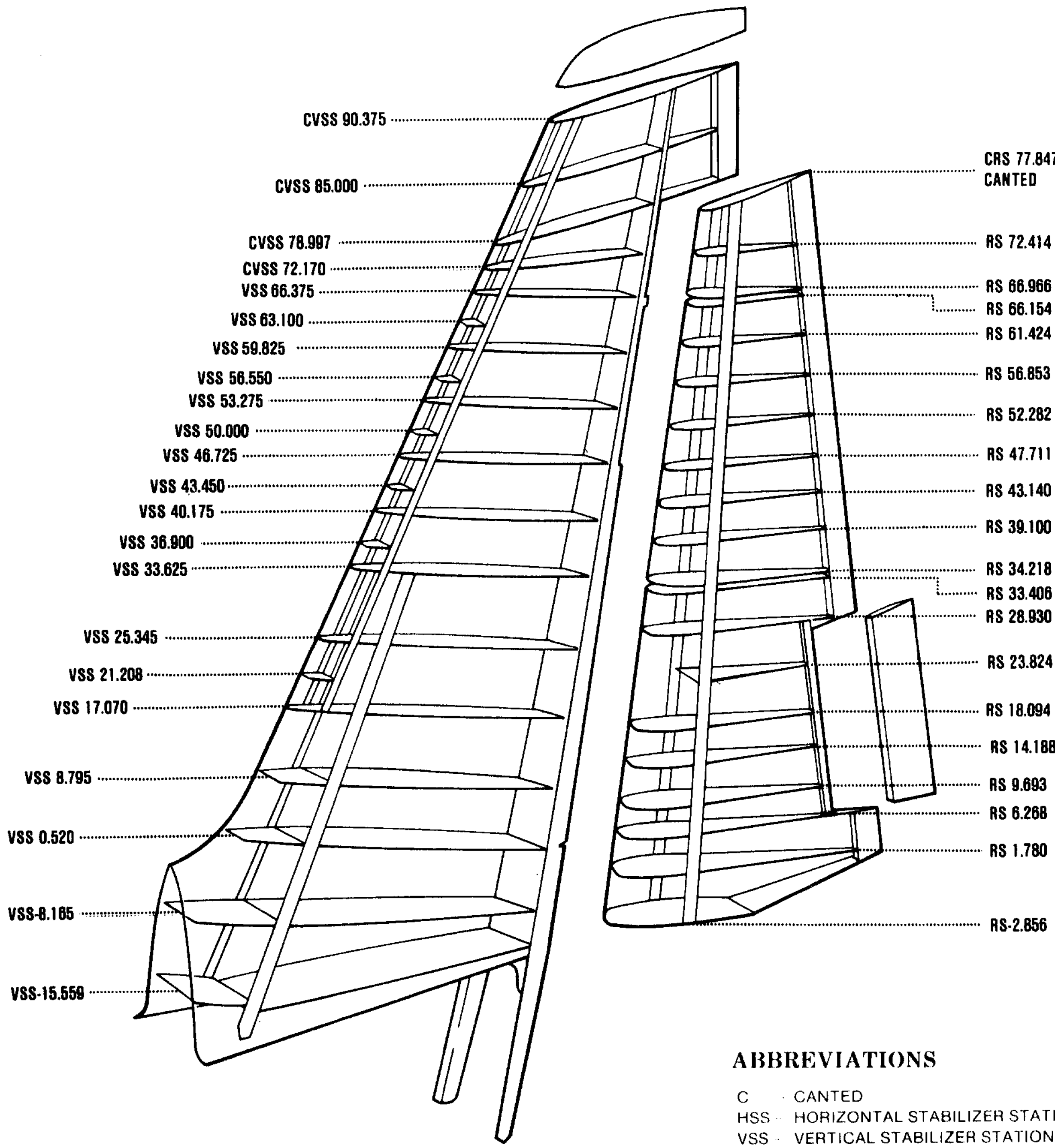
HORIZONTAL STABILIZER/ELEVATOR
MODEL NA 265-40 AND -60

NOTE

SEE FIGURE 18 FOR -60A, -60SC, and -65 HORIZONTAL STABILIZER RUDDER

S265-3-6A

Airplane Empennage Station Diagram
Model NA 265-40, -60, 60A, -60SC and -65
Figure 16



VERTICAL STABILIZER AND RUDDER

ABBREVIATIONS

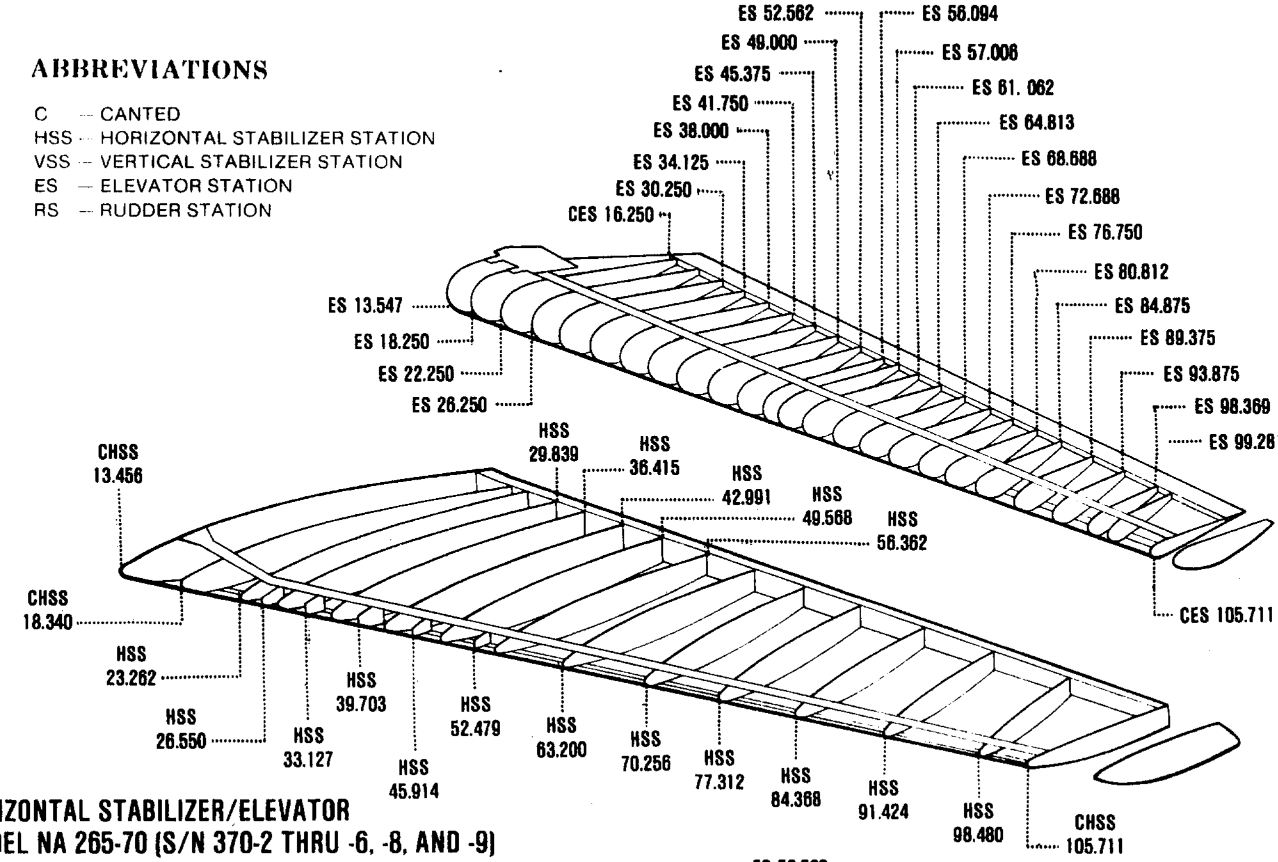
C — CANTED
HSS — HORIZONTAL STABILIZER STATION
VSS — VERTICAL STABILIZER STATION
ES — ELEVATOR STATION
RS — RUDDER STATION

S37033

Airplane Empennage Station Diagram
Model NA 265-70, -80, -80A, and -80SC
Figure 17

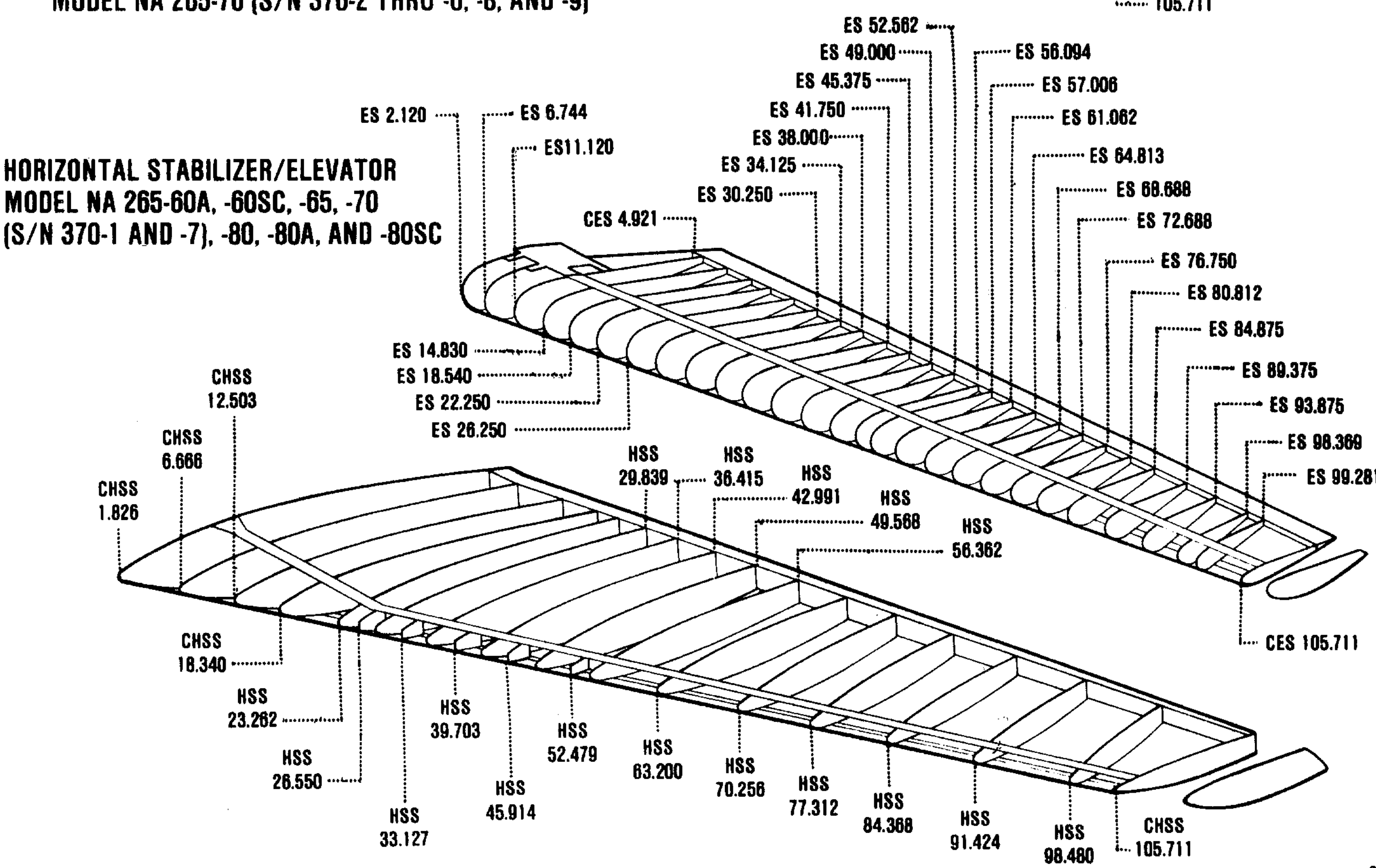
ABBREVIATIONS

C — CANTED
HSS — HORIZONTAL STABILIZER STATION
VSS — VERTICAL STABILIZER STATION
ES — ELEVATOR STATION
RS — RUDDER STATION



HORIZONTAL STABILIZER/ELEVATOR
MODEL NA 265-70 (S/N 370-2 THRU -6, -8, AND -9)

HORIZONTAL STABILIZER/ELEVATOR
MODEL NA 265-60A, -60SC, -65, -70
(S/N 370-1 AND -7), -80, -80A, AND -80SC



S370-3-79

Airplane Empennage Station Diagram
Model NA 265-60A, -60SC, -65, -70, -80, -80A, and -80SC
Figure 18

CHAPTER

32

LANDING GEAR

CHAPTER 32

LANDING GEAR

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Subject	Chapter/Section/Subject	Page

CHAPTER 32

LANDING GEAR

LIST OF ILLUSTRATIONS

CHAPTER 32

LANDING GEAR

LIST OF EFFECTIVE PAGES

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER 32

LANDING GEAR

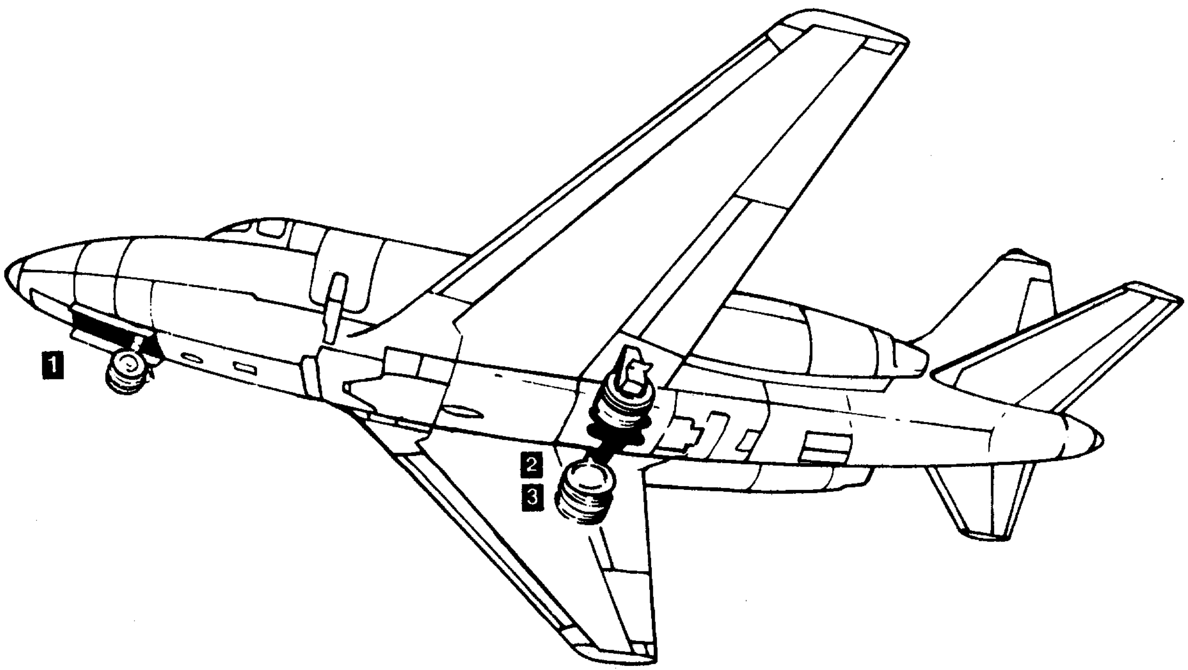
DESCRIPTION

GENERAL

This chapter contains the alignment, repair, and wear inspection for the main and nose landing gear assemblies.

DESCRIPTION

The landing gear is an electrically and hydraulically operated tricycle-type. (See figure 1.) The system receives 28 vdc from the essential dc bus and hydraulic pressure from the hydraulic power system. The landing gear is fully retractable into the fuselage and wings and is faired by the nose wheel doors and main gear strut fairing doors. The subsystems are the landing gear, nose landing gear door, landing gear position indicating and warning system, and landing gear emergency system. The landing gear system contains the necessary electrical wiring and mechanically actuated electrical switches to control retraction and extension of the landing gear and operation of the position indicating and warning system. All sequencing of the landing gear is accomplished with electrical switches.



NOTES

1. ALL MODELS: DUAL NOSE WHEELS
2. MODELS NA 265-70, -80, -80A, AND 80SC: DUAL MAIN WHEELS WITHOUT MAIN WHEEL WELL DOORS.
3. MODELS NA 265-40, -60, -60A, -60SC, AND -65: SINGLE MAIN WHEELS WITH MAIN WHEEL WELL DOORS.

Typical Landing Gear Arrangement
Figure 1

LANDING GEAR

ALIGNMENT INSPECTION

GENERAL

A carefully performed landing gear alignment check can be an aid in (1) determining if a component has been deformed during a landing or taxiing accident and (2) determining cause of a tendency for the airplane to deviate from a true course during take-off or landing.

Note

This alignment check method is not considered an adequate criterion for determining structural integrity or unusual tire wear.

An out-of-tolerance gear does not necessarily indicate that the gear should be replaced. Give all components of the gear a thorough visual inspection (minimum), and a complete operational check. To determine whether conditions warrant gear replacement, all data relative to the alignment problems should be reviewed by qualified personnel after a satisfactory inspection and operational check.

PREPARATION

Tools and equipment listed below are used to accomplish alignment inspection.

Equipment/Tools

- Jack and Pad Set
- Spirit Level
- Steel Tape (25 ft)
- Scale (6 or 12 in.)
- Steel Square (2 ft)
- Inside Calipers
- Wood Wedge (2 each)
- Wood Straightedge (1 × 3 × 41 in.)
- 28 VDC External Electrical Power
- External Hydraulic Power
- Marking Pencil

Jack and level airplane. (Refer to applicable Maintenance Manual, Chapters 7 and 8.)

MAIN LANDING GEAR PROCEDURE

Alignment inspection reference points and procedures are presented on this and the following pages. (See figures 101 and 102, sheets 1 thru 4, as applicable.)

1. With airplane jacked and leveled (see above) use a steel square and marking pencil to divide inner face of each main wheel into quarters. Mark alignment check points. (See figure 101 or 102, sheet 2, as applicable.)
2. Level one set of check points on each wheel and wedge wheel to prevent rotation after leveling. On NA 265-40, S/N 282-1 thru -54 without S/B 66-1, close main wheel doors to improve access to check points between main landing gear.
3. Measure between check points 1 and 2 (L and R) for fore and aft positions. (See figure 101 or 102, sheet 3, as applicable.)
4. Measure between check points 8 and 9 (L and R) and 5L and 5R for lateral positions.
5. Measure between check points 3 and 4 for horizontal wheel angle (toe-in/toe-out). (See figure 101 or 102, sheet 4, as applicable.)
6. Measure between checkpoints 3 and 4 for vertical wheel angle (camber).
7. Measure position of each wheel in relation to fuselage centerline from horizontal wheel angle.

NOSE LANDING GEAR PROCEDURE

Airplane must be jacked and leveled as previously directed. (Refer to PREPARATION.)

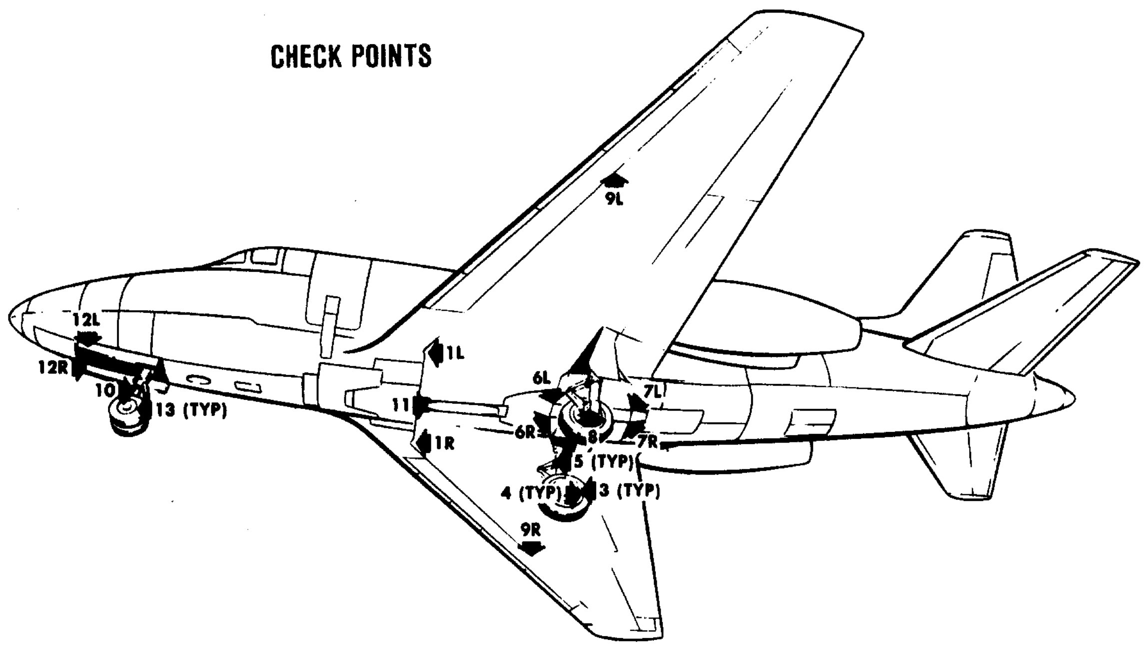
Alignment inspection reference points and procedure are presented on this and the following pages. (See figure 103, sheets 1 and 2.)

1. With nose gear down and locked, establish points 10 and 11. (See figure 103, sheet 1.)
2. Measure and record distance between points 10 and 11.
3. Check to determine compliance with specified tolerance for airplane being checked.
4. Partially retract nose gear until lower edge of wheel rim is even with fuselage mold line.
5. Measure and record distance between points 12L and 13L, and between 12R and 13R.
6. Determine differences between measurements.
7. Check to determine compliance with specified tolerance.
8. Lower and lock landing gear.
9. Place wood straightedge vertically on wheel rim at center of wheel, point 13L or 13R. (See figure 103, sheet 2.) Use suitably sized spacer(s) so straightedge does not rest against tire and is parallel to plane of wheel rim.

ALIGNMENT INSPECTION (Continued)

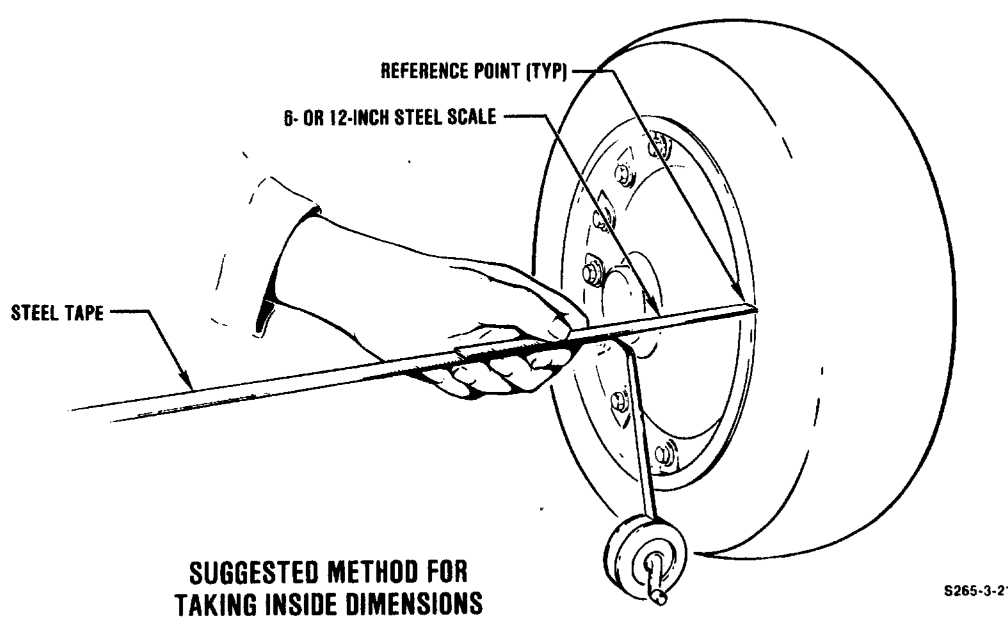
NOSE LANDING GEAR PROCEDURE (Cont'd)

10. Raise straightedge until it is in contact with nose gear trunnion beam lower cap.
11. Place edge of 6 or 12 in. scale against lower inner face of nose gear trunnion beam lower cap and straightedge.
12. Mark extension of point 12 (edge of scale) on straightedge.
13. Repeat steps 9 through 12 twice more, turning wheel 60° each time to account for variations in wheel.
14. Mark centerline between extreme measured positions. This will be dimension between 12 and 13 (L or R).
15. Repeat steps 9 through 14 for opposite wheel.
16. Measure distances found for points 12L to 13L and 12R to 13R. Determine difference between measurements.
17. Check result for compliance with specified tolerance.



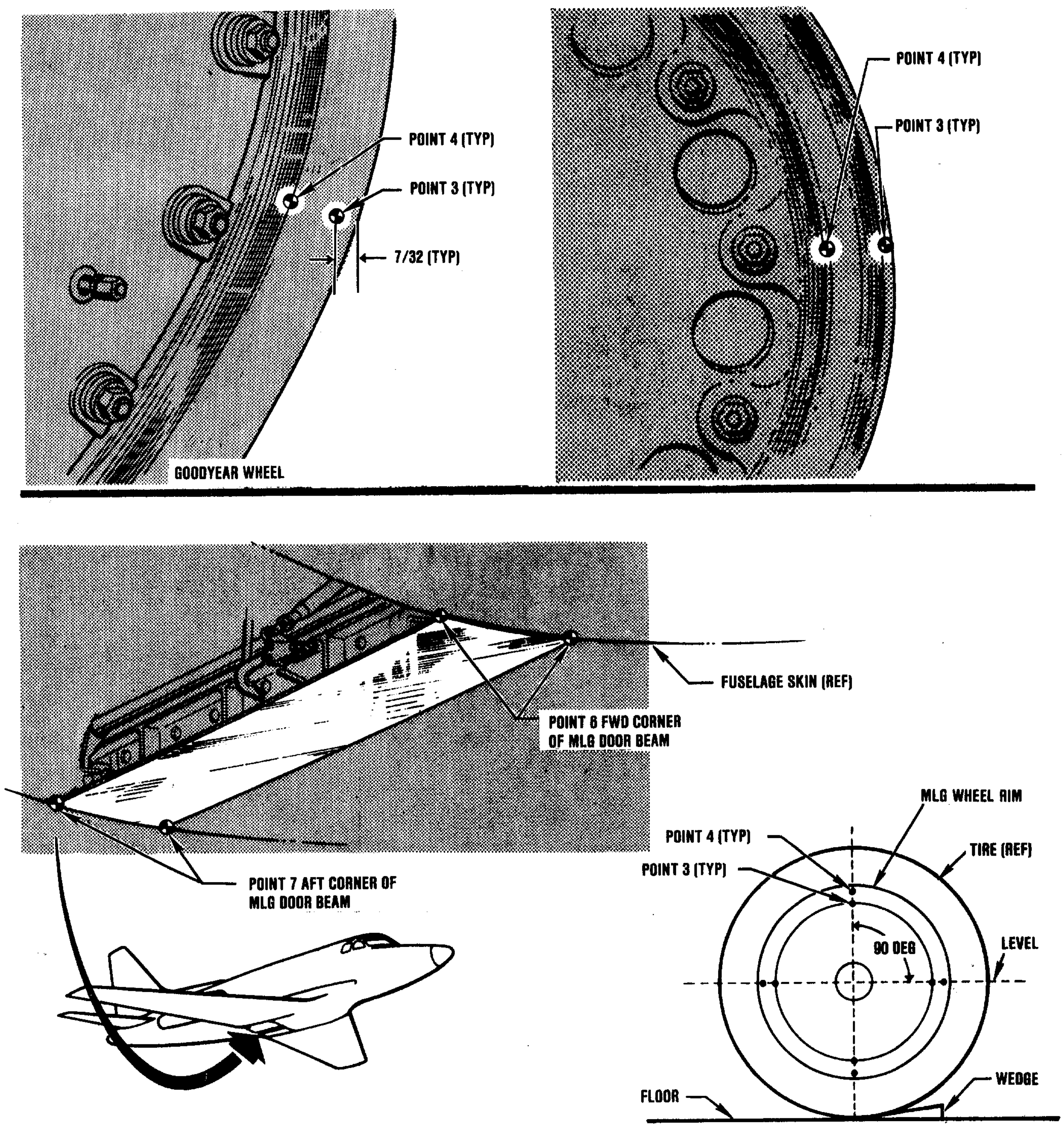
NOTES

- POINTS 2 AND 5 ARE LOCATED ON MAIN STRUT SCISSORS (SEE SHEET 3 OF 4).
- POINTS 10, 11, 12, AND 13 ARE USED IN CHECKING NOSE GEAR ALIGNMENT.
- POINTS 1, 2, 5, 8, AND 9 ARE USED IN CHECKING MLG STRUT ALIGNMENT.
- POINTS 3, 4, 6, AND 7 ARE USED IN CHECKING MLG WHEEL ALIGNMENT.
- DETAILED VIEWS OF APPLICABLE CHECK POINTS ARE SHOWN WITH THE REFERENCED CHECK ILLUSTRATIONS.



Main Landing Gear Alignment
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 101 (Sheet 1 of 4)

MLG WHEEL



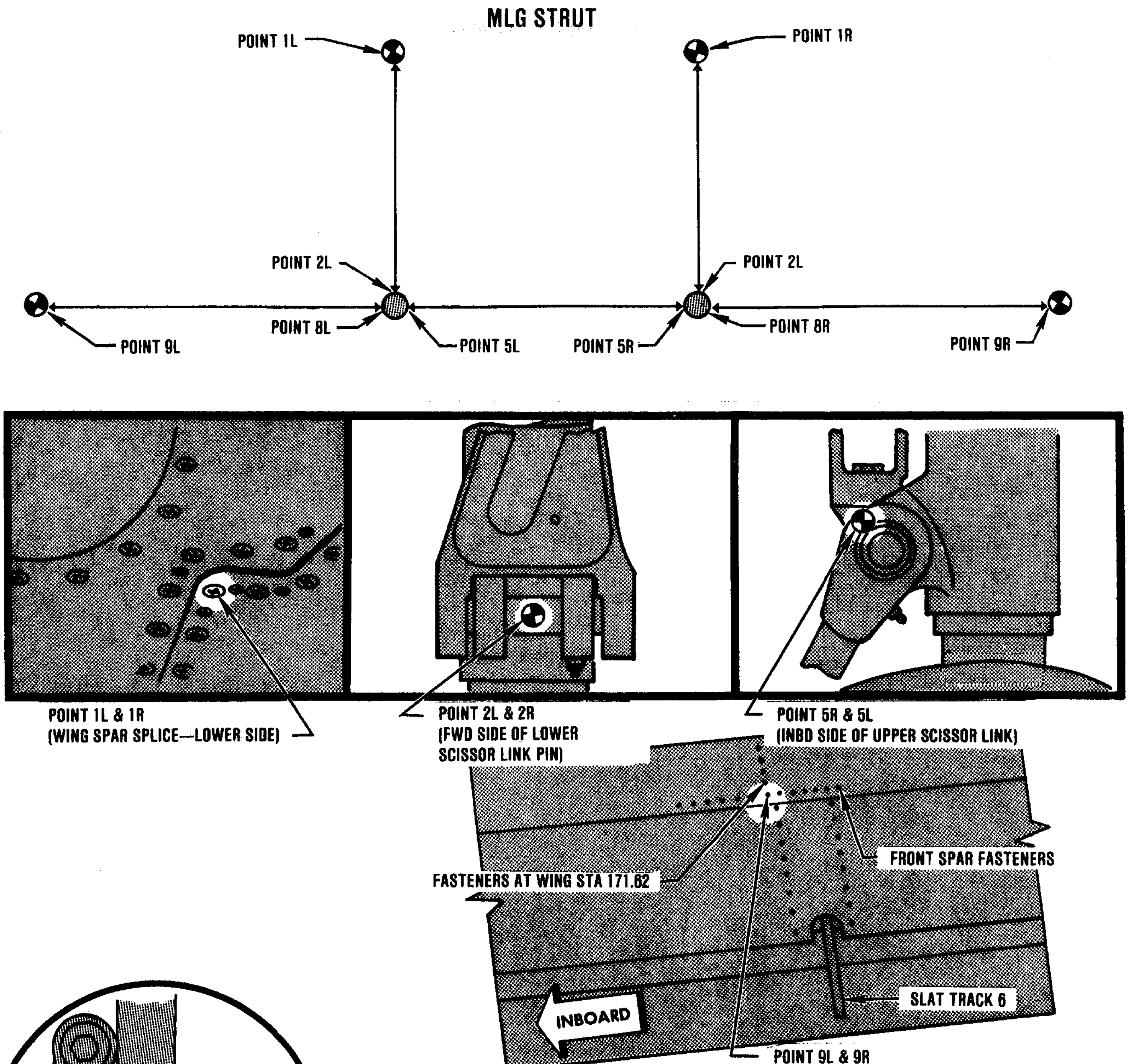
CODING FOR POINTS 3 AND 4:

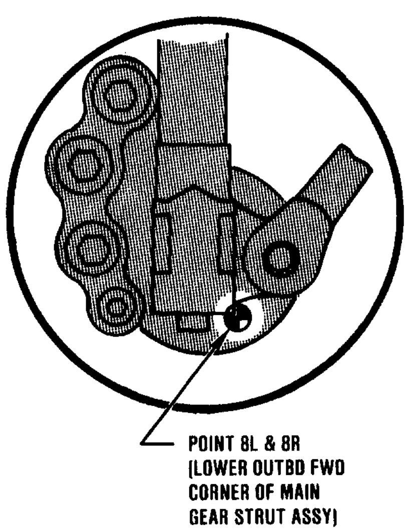
LF—LEFT FWD	LT—LEFT TOP
RF—RIGHT FWD	RT—RIGHT TOP
LR—LEFT REAR	LB—LEFT BOTTOM
RR—RIGHT REAR	RB—RIGHT BOTTOM

1. Divide inner face of each wheel rim into quarters.
2. Level two points on wheel as shown.
3. Block wheel to retain leveled position for each measurement.

S265-3-24

Main Landing Gear Alignment
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 101 (Sheet 2 of 4)



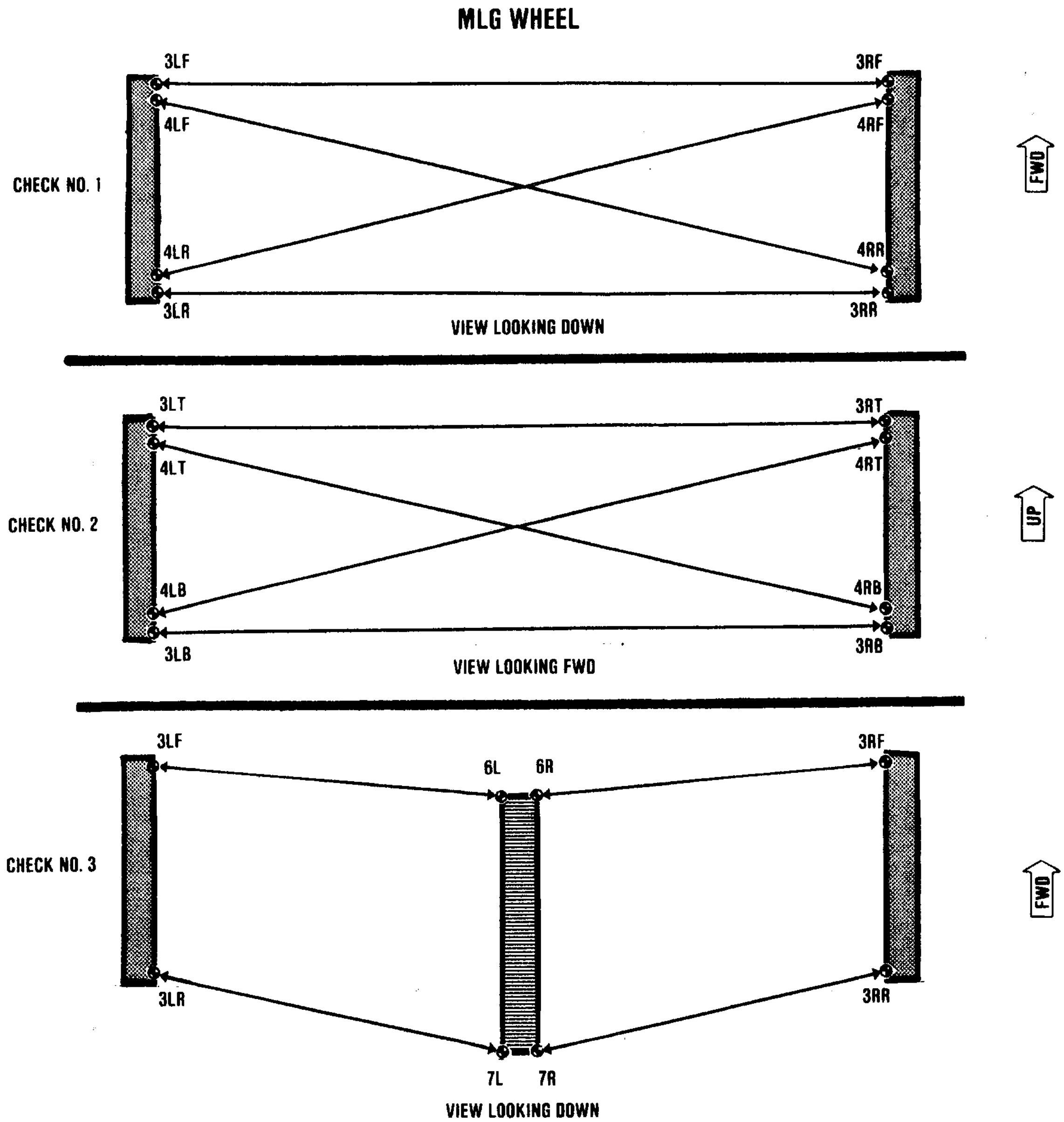


ALIGNMENT TOLERANCES

POINT	DIMENSIONS	TOLERANCES
1L TO 2L 1R TO 2R	70-11/32	±3/8
8L TO 9L 8R TO 9R	116-3/8	±1/4
5L TO 5R	96-9/32	±1/4

S265-3-23

Main Landing Gear Alignment
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 101 (Sheet 3 of 4)



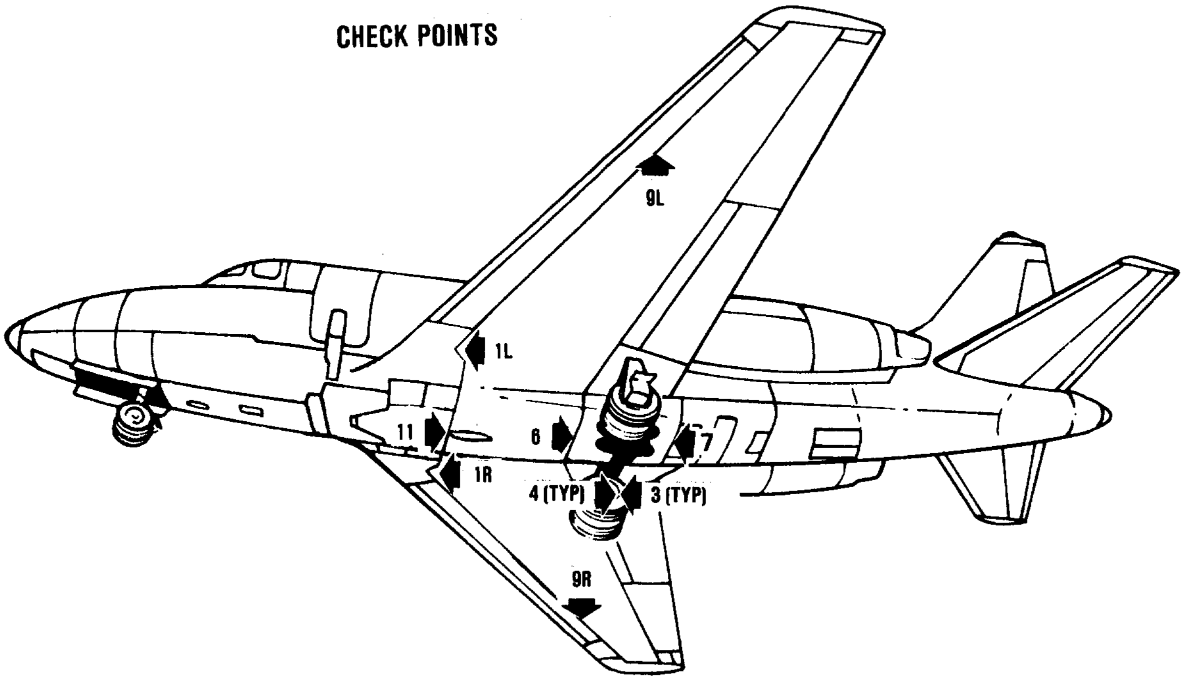
ALIGNMENT TOLERANCES

CHECK NO.	POINT TO POINT	=	POINT TO POINT	TOLERANCE
1	3LF TO 3RF	=	3LR TO 3RR	±1/4
	4LF TO 4RR	=	4LR TO 4RF	±1/4
2	3LT TO 3RT + 17/32	=	3LB TO 3RB	±3/8
	4LT TO 4RB	=	4LB TO 3RT	±3/8
3	3LF TO 6L + 2-11/16	=	3LR TO 7L	±1/8
	3RF TO 6R + 2-11/16	=	3RR TO 7R	±1/8

S265-3-25

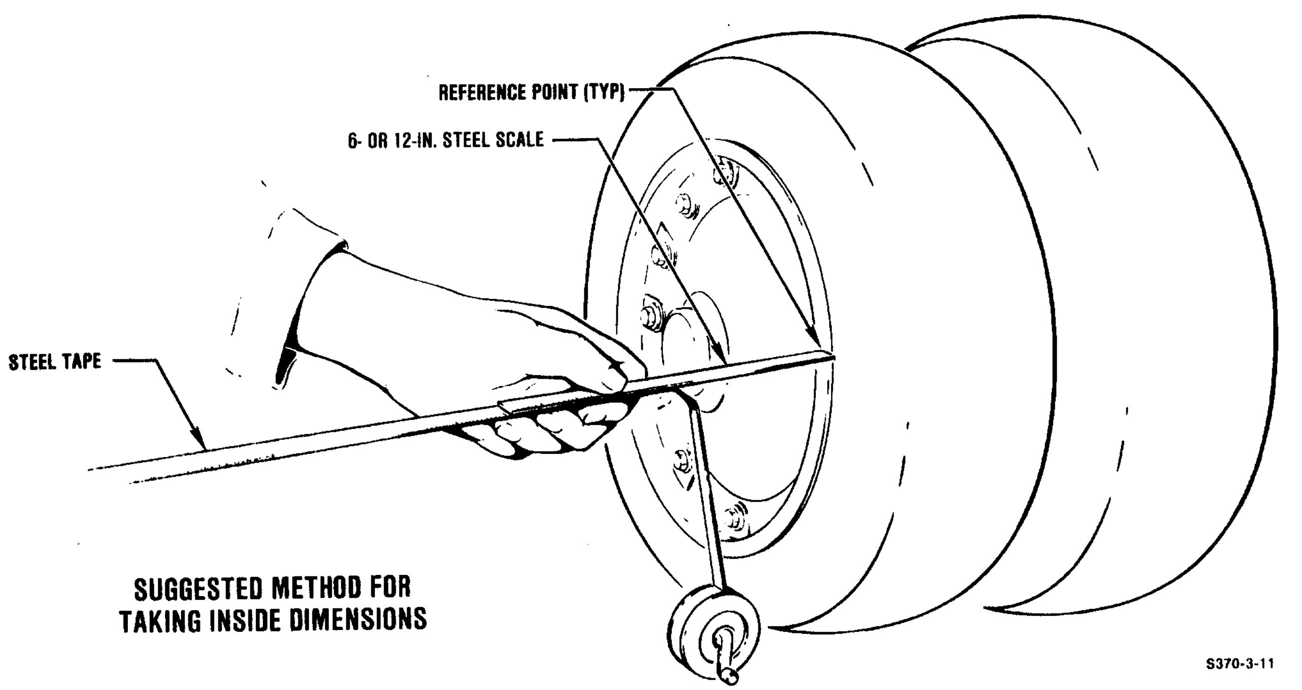
Main Landing Gear Alignment
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 101 (Sheet 4 of 4)

CHECK POINTS



NOTES

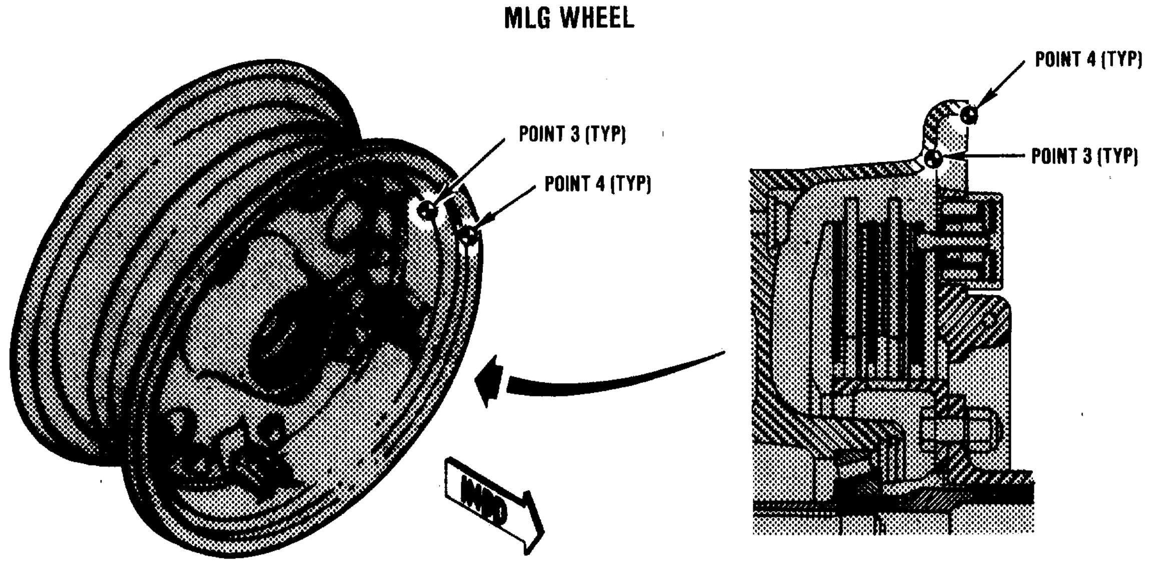
- POINTS 1, 2, 5, 8, AND 9 ARE USED IN CHECKING MLG STRUT ALIGNMENT.
- POINTS 3, 4, 6, AND 7 ARE USED IN CHECKING MLG WHEEL ALIGNMENT.
- POINTS 2 AND 5 ARE LOCATED ON MAIN STRUT SCISSORS, SEE SHEET 3 OF 4 FOR LOCATIONS.
- DETAILED VIEWS OF APPLICABLE CHECK POINTS ARE SHOWN WITH THE REFERENCED CHECK ILLUSTRATIONS.



SUGGESTED METHOD FOR
TAKING INSIDE DIMENSIONS

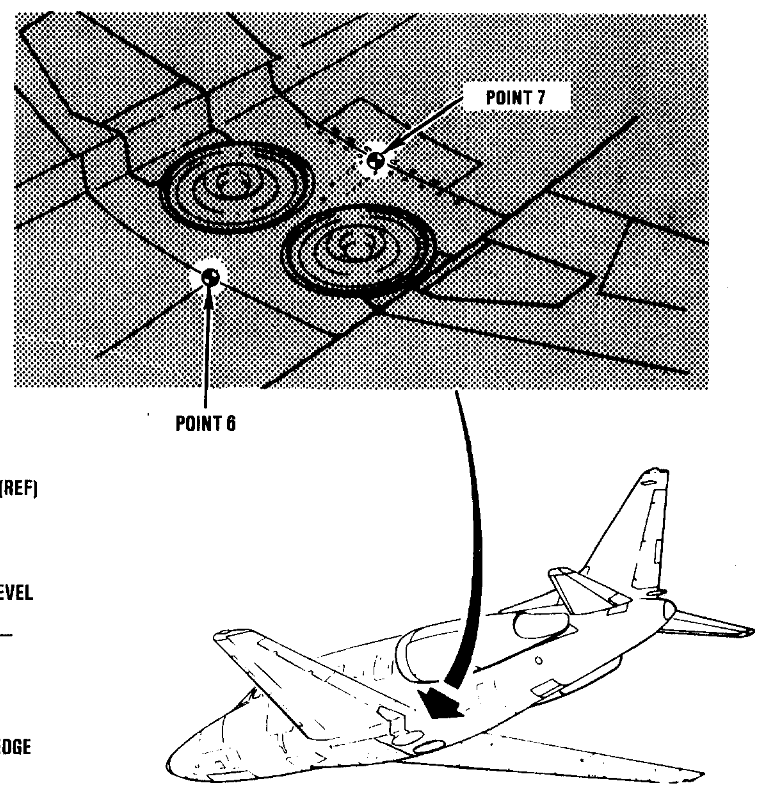
S370-3-11

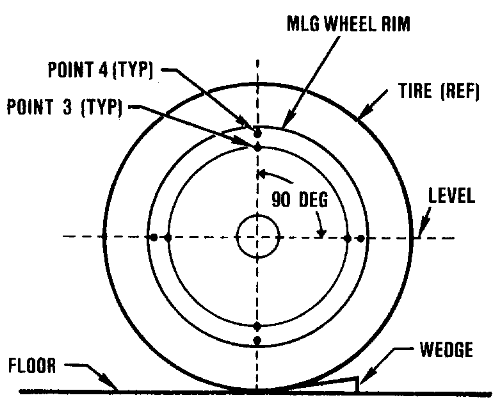
Main Landing Gear Alignment
Model NA 265-70, -80, -80A, and -80SC
Figure 102 (Sheet 1 of 4)



CODING FOR POINTS 3 AND 4:

LF—LEFT FWD	LT—LEFT TOP
RF—RIGHT FWD	RT—RIGHT TOP
LR—LEFT REAR	LB—LEFT BOTTOM
RR—RIGHT REAR	RB—RIGHT BOTTOM

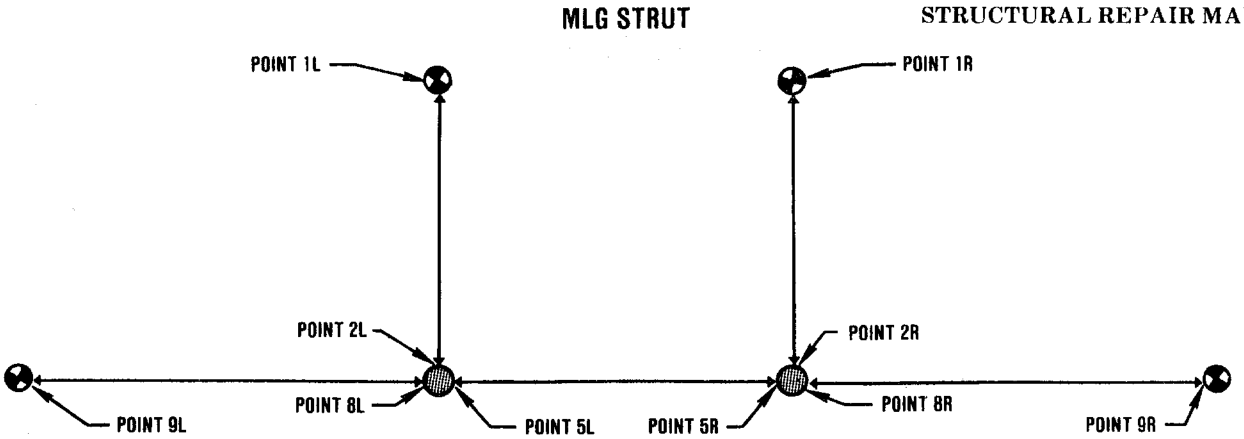


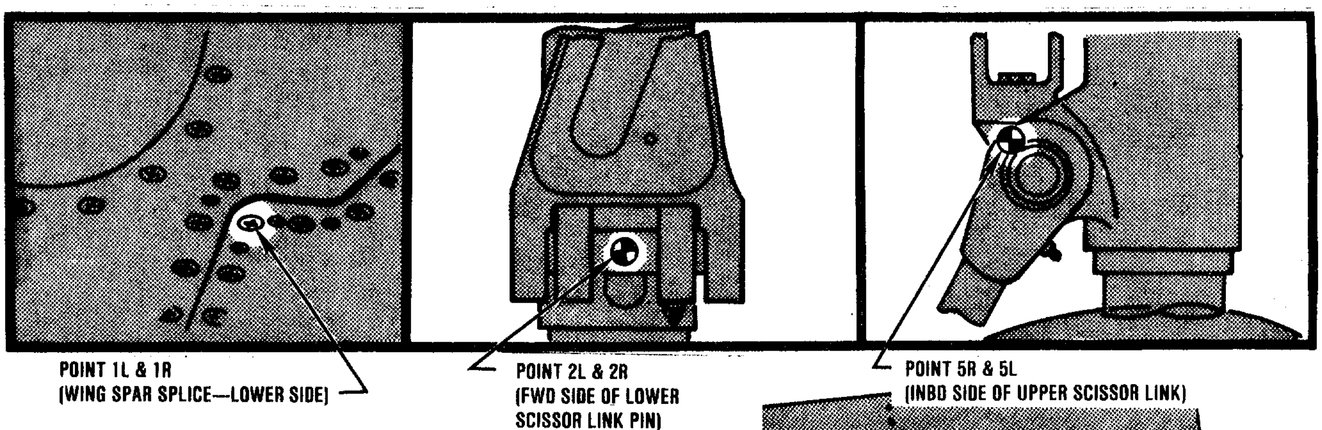


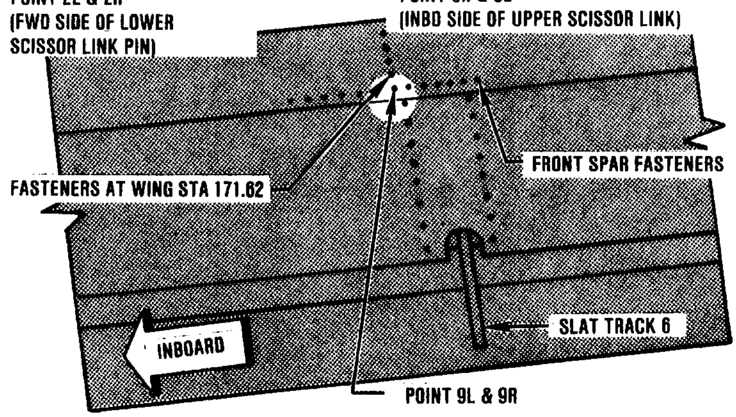
1. Divide inner face of each wheel rim into quarters.
2. Level two points on wheel as shown.
3. Block wheel to retain leveled position for each measurement.

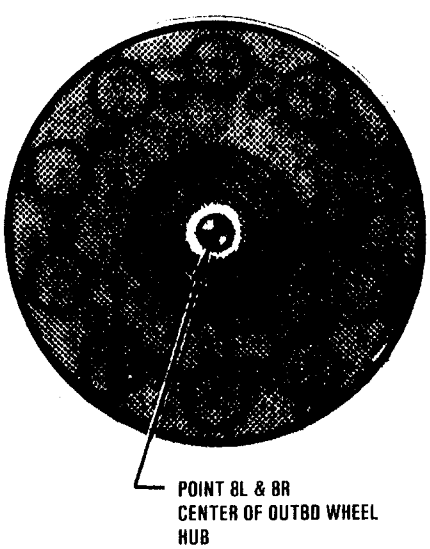
S370-3-13

Main Landing Gear Alignment
Model NA 265-70, -80, -80A, and -80SC
Figure 102 (Sheet 2 of 4)







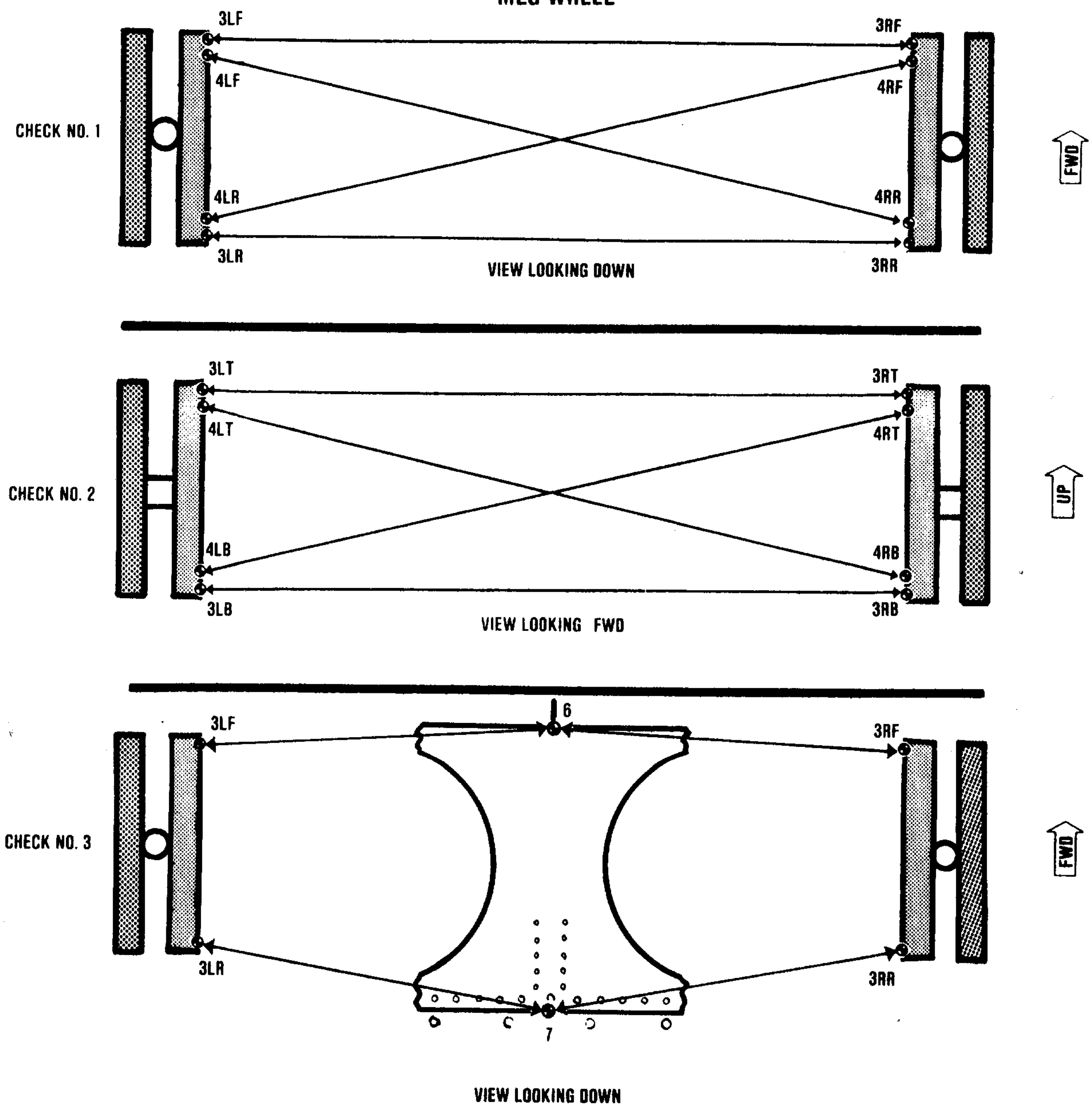


ALIGNMENT TOLERANCES

POINT	DIMENSIONS	TOLERANCES
1L TO 2L 1R TO 2R	70	±3/8
8L TO 9L 8R TO 9R	109-3/8	±1/4
5L TO 5R	96-1/2	±1/4

Main Landing Gear Alignment
Model NA 265-70, -80, -80A, and -80SC
Figure 102 (Sheet 3 of 4)

MLG WHEEL



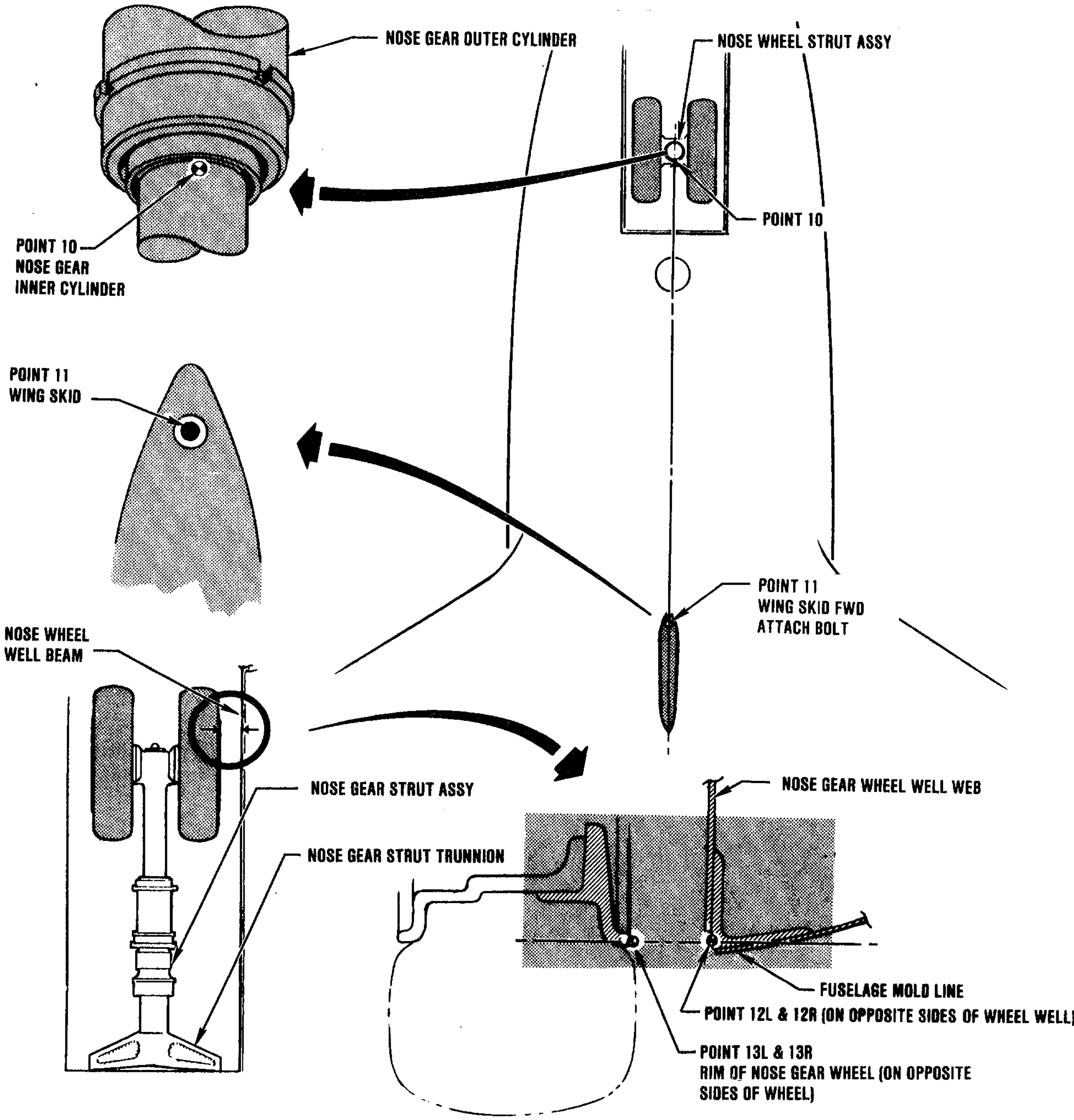
ALIGNMENT TOLERANCES

CHECK NO.	POINT TO POINT	=	POINT TO POINT	TOLERANCE
1	3LF TO 3RF	=	3LR TO 3RR	±1/4
	4LF TO 4RR	=	4LR TO 4RF	±1/4
2	3LT TO 3RT + 17/32	=	3LB TO 3RB	±3/8
	4LT TO 4RB	=	4LB TO 3RT	+3/8
3	3LF TO 6L + 2-11/16	=	3LR TO 7L	†1/8
	3RF TO 6R + 2-11/16		3RR TO 7R	†1/8

S370-3-14

Main Landing Gear Alignment
Model NA 265-70, -80, -80A, and -80SC
Figure 102 (Sheet 2 of 4)

NOSE GEAR



ALIGNMENT TOLERANCES

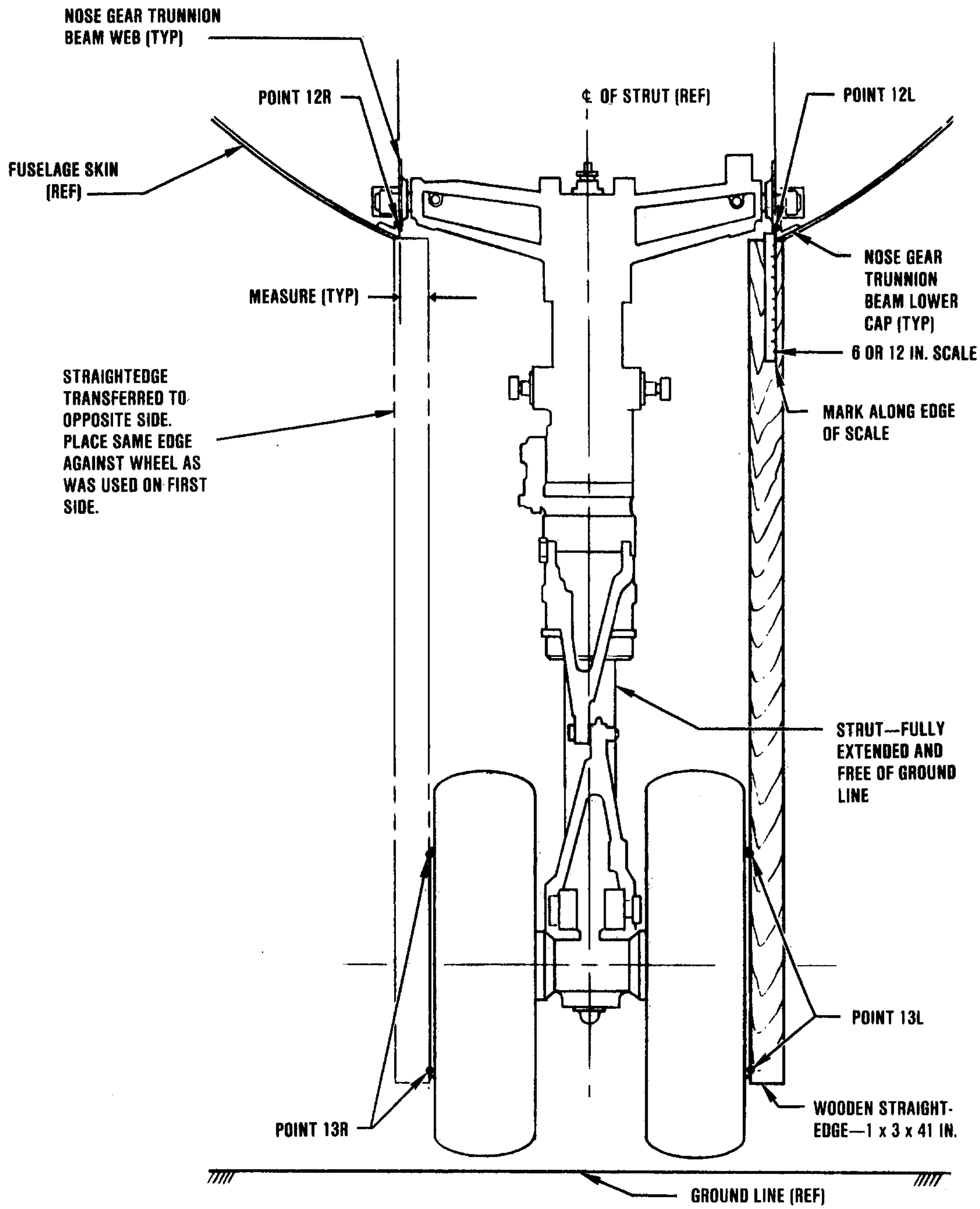
CHECK NO.	POINT	DIMENSION	TOLERANCE
3	12L TO 13L	EQUAL TO 12R TO 13R	WITHIN 1/16 INCH

NOTE

DIMENSIONS IN INCHES.

S265-3-22A

Nose Landing Gear Alignment
Figure 103 (Sheet 1 of 2)



ALIGNMENT TOLERANCES

CHECK NO.	POINT	DIMENSIONS	TOLERANCES
3	12L TO 13L	EQUAL TO 12R TO 13R	WITHIN 1/16 IN.

S265-3-329

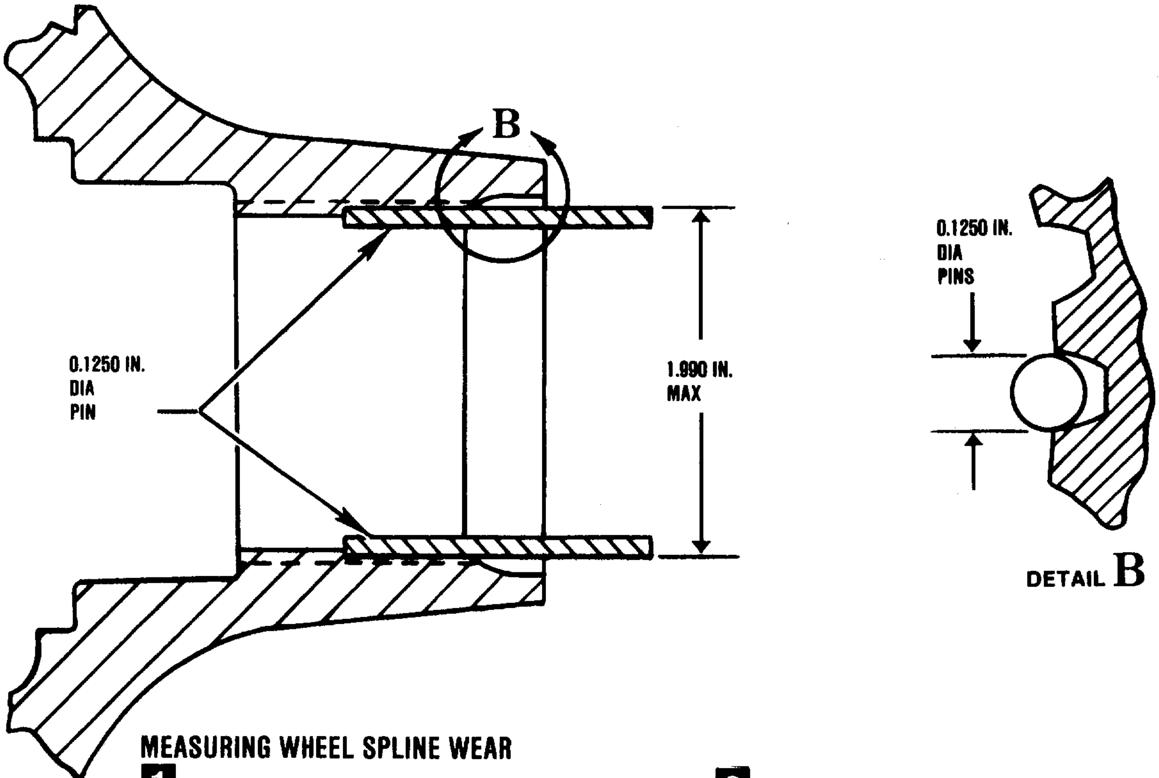
Nose Landing Gear Alignment
Figure 103 (Sheet 2 of 2)

LANDING GEAR

WEAR AND REBUSHING ALLOWANCES

GENERAL

See figures 101 and 102 for allowable wear data and rebushing requirements for the main landing gear and the nose gear.



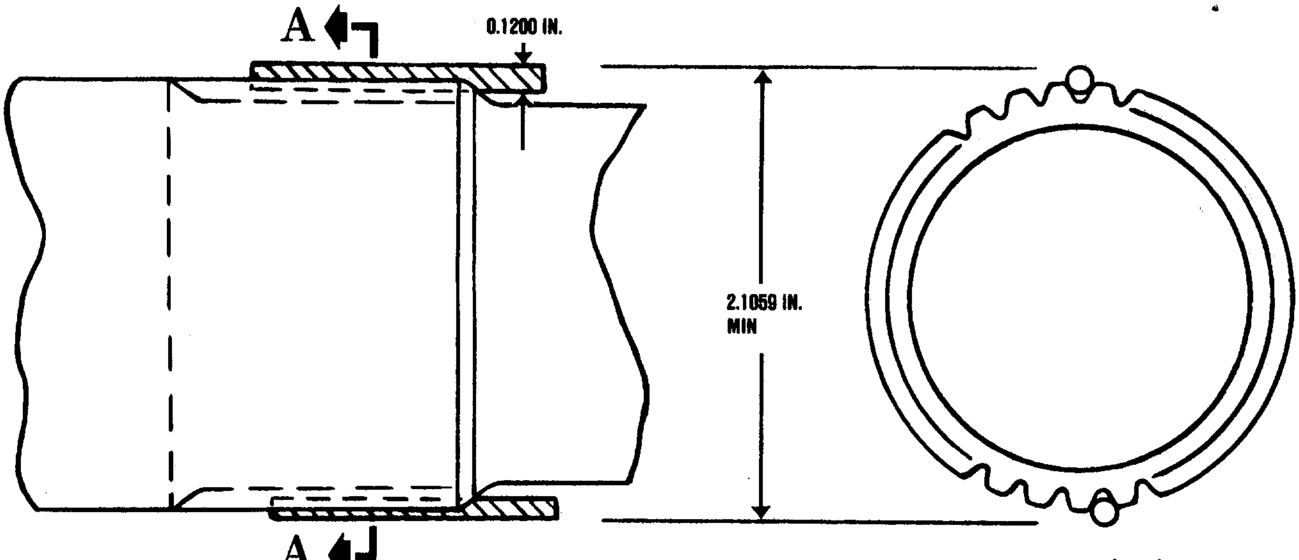
MEASURING WHEEL SPLINE WEAR

1 POSITION TWO 0.1250 IN. DIAMETER PINS IN SPLINE AS SHOWN.

2 INSURE THAT PINS ARE INSERTED IN WORN AREAS OF THE SPLINE ONLY.

3 CLAMP PINS FIRMLY IN PLACE AND MEASURE DIMENSIONS TO OUTSIDE OF PINS.

4 IF THIS DIMENSION EXCEEDS 1.990 IN., SPLINE WEAR IS OUT OF TOLERANCE. REPLACE WHEEL.



SECTION A-A

S265-3-330

MEASURING AXLE SPLINE WEAR

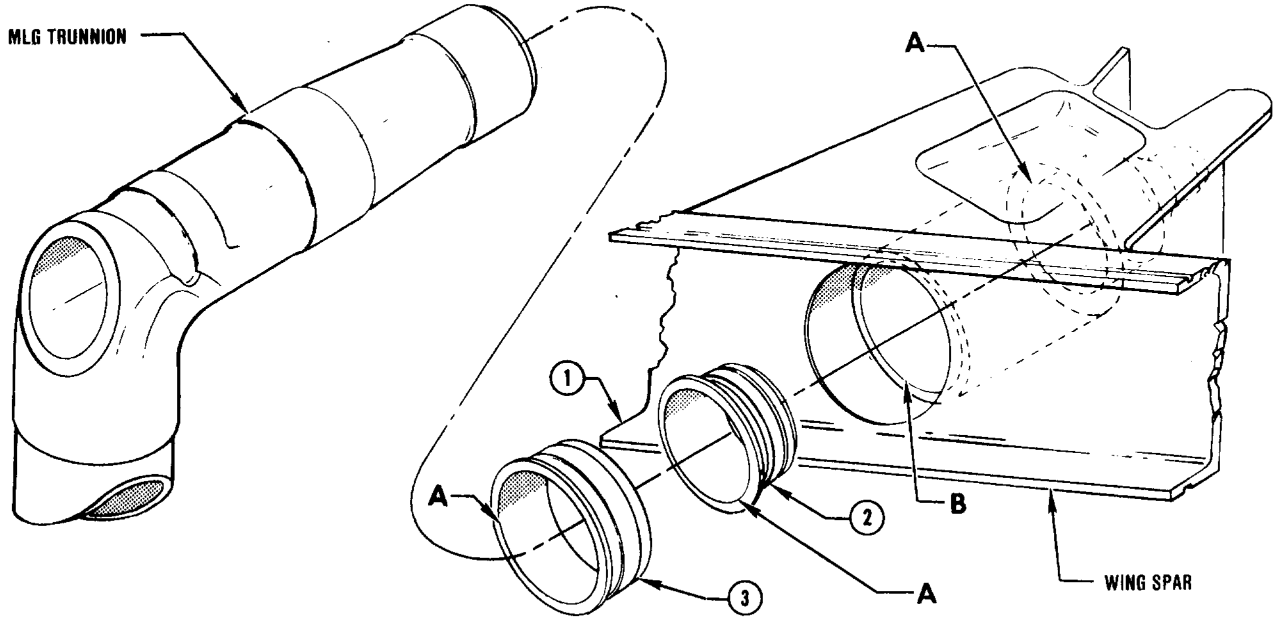
1 POSITION TWO 0.1200 IN. DIAMETER PINS ON SPLINE AS SHOWN.

2 INSURE THAT PINS ARE INSERTED IN WORN AREAS OF SPLINE ONLY.

3 CLAMP PINS FIRMLY IN PLACE AND MEASURE DIMENSIONS TO OUTSIDE OF PINS.

4 IF THIS DIMENSION IS LESS THAN 2.1059 IN. (AVERAGE OVER LENGTH OF SPLINE), REPLACE AXLE.

Allowable Wear - Nose Wheel and Axle Splines
Figure 101



WEAR ALLOWANCES (DIMENSIONS IN INCHES)

ITEM NO.	DESCRIPTION	HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	SPAR 265-130017	A	BEARING 265-336123	3.1880	3.1890	−0.0010	−0.0010
		B	BEARING 265-336124	4.0630	4.0650	−0.0020	−0.0020
2	BEARING 265-336123	A	TRUNNION	2.8775	2.8732	0.0043	0.0063
3	BEARING 265-336124	A	TRUNNION	3.7535	3.7482	0.0053	0.0083

REBUSHING DATA (DIMENSIONS IN INCHES)

ITEM NO.	DESCRIPTION	HOLE	REAM DIA (MAX)	BUSHING			
				MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	SPAR 265-130017	A	3.1980	A C Al Bronze	———	2.8760	D 2.8770
		B	4.0730	B C Al Bronze	———	3.7520	E 3.7530
2	BEARING 265-336123	A	———	REPLACE WORN PART.			
3	BEARING 265-336124	A	———	REPLACE WORN PART.			

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INSTRUCTIONS.
- ONE HUNDRED PERCENT CLEANUP IS NOT REQUIRED FOR HONED SURFACES.

A AMS4631 AL BRONZE BAR: MIN TENSILE ULTIMATE = 65,000 PSI; MIN YIELD = 32,500 PSI.

B AMS4631 AL BRONZE BAR: MIN TENSILE ULTIMATE = 55,000 PSI; MIN YIELD = 27,500 PSI.

C AL BRONZE CASTING, FED. SPEC QQ-B-671, WITH CLASS 3 HEAT-TREAT MAY BE SUBSTITUTED FOR AMS4631 BRONZE BAR.

D MAX HONED DIAMETER AFTER PRESSING = 2.8775.

E MAX HONED DIAMETER AFTER PRESSING = 3.7535.

265-3-40

Allowable Wear and Rebushing Data
Main Landing Gear Trunnion
Figure 102

LANDING GEAR SHOCK STRUTS

REPAIR LIMITS AND PROCEDURES

INTRODUCTION

This section sets the limits of crack damage of the main landing gear outer cylinders, P/N 1127L001-3, -4, -5 and -6. The procedure for inspection of the MLG assembly is found in the applicable Sabreliner Maintenance Manual Chapter 32.

REPAIR LIMITS AND PROCEDURES

1. Blend out all cracks and corrosion using paper backed abrasive. Keep in mind the following points;

   NOTE

   If the detected crack is greater than one inch, contact Sabreliner Corporation Engineering Department for disposition.

   a. All radii to be 0.5 inches or greater and the surface to be 64 RMS or better.

   b. Keep the temperature of the ground area to a minimum. The area should be comfortable to the touch at all times. Limit drill speeds to less than 400 RPM.

2. Layout damage zones, see Figure 201, to determine which zone the crack occurs in. First establish points A thru I below, then mask using narrow tape to determine boundary. Use a grease pencil or equivalent to mark points.

   a. Point A. Mark point on aft edge of trunnion upper center line.

   b. Point B. Mark point 3/8 in. from upper edge of trunnion open (aft) end as measured along trunnion upper center line.

   c. Point C. Mark point 10 1/2 in. from end of trunnion as measured along trunnion lower center line. Draw a line connecting point B to point C around to point B.

   d. Point D. Mark point 3/4 in. aft of point C as measured along trunnion lower center line.

   e. Point E. Mark point 1 1/2 in. aft of point C as measured along trunnion on lower center line and passing through point D. Draw a line connecting points B and E and passing through Point D.

   f. With a square, measure from point A down 4 1/4 in. to locate point F. Mark point F. Draw a line connecting point F to point E around to point F.

   g. With a square, measure vertically from point A down 2 1/4 in. to locate point G on inbd and outbd surface of trunnion.

   h. Draw a line to connect point D to point G.

   i. Point H. Mark point 1 1/2 in. measured from point G along line connecting point D to point G on inbd and outbd surface of trunnion.

   j. Point I. Mark point 2 in. measured from point H along line connecting point D to point G on inbd and outbd surface of trunnion.

   k. Draw a vertical line, parallel to vertical center line, through point H on inbd and outbd strut surfaces.

   l. Draw an arcing line, following curvature of strut, through point I connecting line B-C-B to line F-E-F defining zones 2B and 2C on inbd and outbd strut surfaces.

   Establish zone 2 for outbd and inbd sides of trunnion as follows:

   a. With masking tape, mask a line between points B and C and around to B. This is line B-C-B.

   b. With masking tape, mask a line between points F to E and around to F. This is line F-E-F.

   Establish zones 2A, 2B, and 2C on both sides of trunion, using ridge lines as marked in figure 203.

   Establish zone 1 for outbd and inbd sides of trunnion as follows:

   a. With masking tape, mask a line at aft edge of plated bearing surface around strut. This is line X-X-X.

   b. The area between line X-X-X and line B-C-B is zone 1.

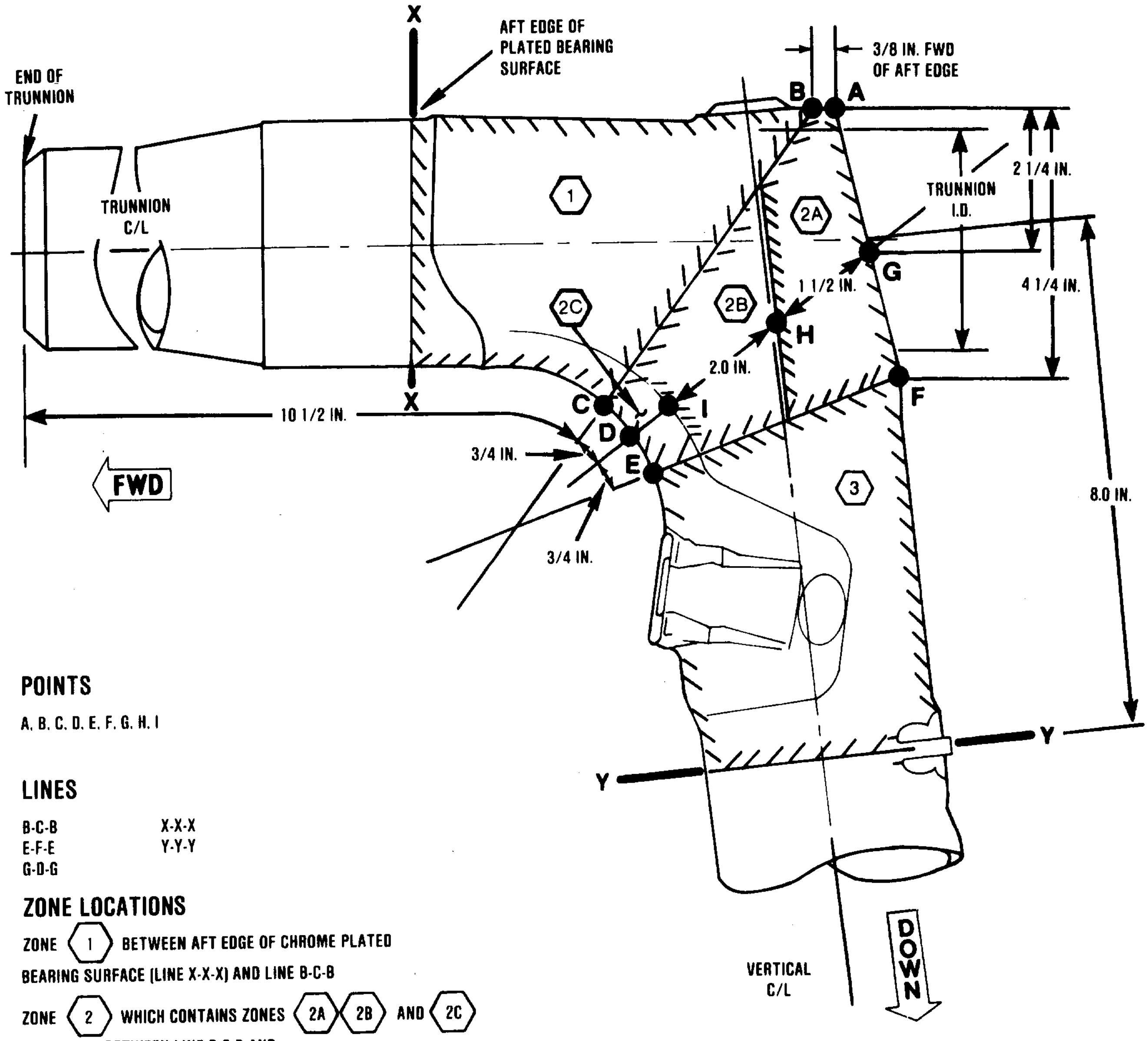
   Establish zone 3 for outbd and inbd sides of trunnion as follows:

   a. With masking tape, mask a line running around strut and located 8.0 in. below trunnion center line as measured along aft center line of strut. This is line Y-Y-Y.

   b. The area between F-E-F and Y-Y-Y is zone 3.

3. If blend out depths and lengths are within limits presented by Figure 202, then finish per Sabreliner Maintenance Manual Chapter 32, otherwise, replace the cylinder or contact Sabreliner Corporation Engineering Department for disposition.

MAJOR CHANGE



POINTS

A, B, C, D, E, F, G, H, I

LINES

B-C-B	X-X-X
E-F-E	Y-Y-Y
G-D-G	

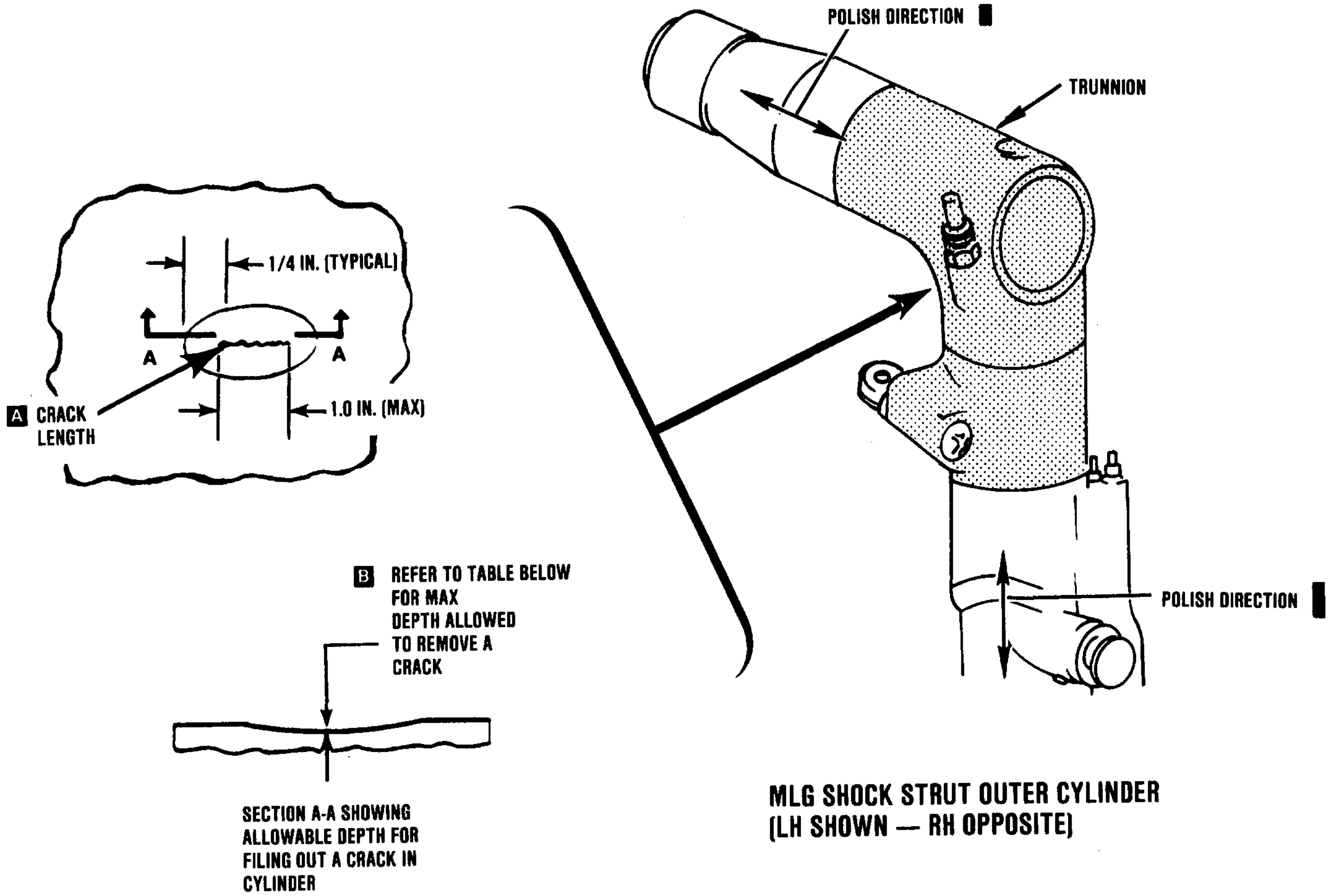
ZONE LOCATIONS

ZONE ⟨1⟩ BETWEEN AFT EDGE OF CHROME PLATED BEARING SURFACE (LINE X-X-X) AND LINE B-C-B

ZONE ⟨2⟩ WHICH CONTAINS ZONES ⟨2A⟩⟨2B⟩ AND ⟨2C⟩ IS LOCATED BETWEEN LINE B-C-B AND LINE F-E-F.

ZONE ⟨3⟩ BETWEEN LINE F-E-F AND LINE Y-Y-Y, 8.0 IN. BELOW CENTER OF TRUNNION AFT OPEN END.

Figure 201 — MLG Shock Strut Outer Cylinder 1127L001-3, -5, (LH) and -4, -6 (RH) Inspection Zones



NOTES

- A *Maximum allowable length before blending.*
- B *If the max depth required to remove any one crack exceeds the zone limits listed in table, contact Sabreliner Engineering Department for engineering analysis.*
- C *See Figure 201 for zone location.*

ALLOWABLE REPAIR LIMITS

C ZONE	CRACK LIMITS	
	B MAX DEPTH (IN.)	A MAX LENGTH (IN.)
1	0.030	1.000
2A	0.060	1.000
2B	0.020	1.000
2C	0.050	1.000
3	0.030	1.000

Figure 202 — MLG Shock Strut Outer Cylinder
1127L001-3, -5 (LH) and -4, -6 (RH) Repair Limits and Procedures

CHAPTER 51

STANDARD PRACTICES- STRUCTURES

CHAPTER 51

STRUCTURES

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CHAPTER 51

STRUCTURES

STRUCTURAL IDENTIFICATION

GENERAL

The major structural groups of the airplane are the doors, fuselage, nacelles/pylons, stabilizers, windows, and wings. (Refer to Master Repair Index, table 1 in the Introduction.)

TYPE OF CONSTRUCTION

This is an all-metal airplane with full-cantilever wings and horizontal stabilizer. The fuselage is of semi-monocoque construction and supports an engine nacelle on each side in the area above and aft of the wing.

On Model NA 265-40, -60, -70 and -80, the basic structure of the wing consists of front and rear spars, transverse ribs, and upper and lower machine-milled skins. This forms the main box beam, which extends from wing tip to wing tip. The slats and leading edge are made of conventional sheet-metal rib and skin construction. Chem-milled skins are used on the underslat leading edge. The trailing edge cantilevers from the rear spar of the main box section and is constructed of beams, ribs, skins, and honeycomb sandwich panels. The flaps and ailerons consist primarily of beams, transverse ribs, skins, and honeycomb sandwich panel trailing edges.

On Model NA 265-60A, -60SC, -65, -80A, and -80SC, the basic Sabreliner wing has been modified by replacing the existing leading edge and slats with a new extended leading edge. This modification forms an additional fuel tank. The modified wing also incorporates a new trailing edge which is cantilevered from the rear spar. The existing wing flaps are replaced with larger Fowler-type flaps which are completely covered by the trailing edge when the flaps are in the retracted position. The trailing edge also contains hydraulically operated spoilers.

The vertical and horizontal stabilizers are fully cantilevered structures consisting of beams, transverse ribs, stringers, and skins. The vertical stabilizer trailing edge, above the rudder, is honeycomb sandwich panel.

The rudder and elevators consist of a rear beam, fwd stringers, transverse ribs, skins, and honeycomb sandwich panel trailing edges.

The fuselage basic structure consists of four main longerons, several secondary longerons, various stringers and intercostals, conventional frames, and chem-milled aluminum alloy stressed skins.

The principal structure of each engine nacelle for Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8 and -9) consists of the main engine support beam, a fixed stainless-steel fire wall, three upper fairing doors, one lower fairing door, and an aluminum nose section. Each nacelle is supported by an airfoil pylon made up of leading edge, chem-milled upper and lower skins, transverse frames, and a honeycomb trailing edge beam.

The principal structure of engine nacelles on Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC consists of a nose section secured directly to the front face of the engine, three engine access doors (upper, lower inbd and lower outbd), and the aft fairing bolted to the fwd frame of the engine aft fan housing. The aft fairing also contains the thrust reverser.

The principal structure of the engine nacelles for the Model NA 265-65 consists of the nose section secured to the fwd face of the engine, upper and lower cowl doors, and the aft fairing section which contains the thrust reverser blocker doors and thrust reverser operating mechanism.

The complete nacelle assembly is cantilevered from the pylon by engine support fittings, and structural carry-through fittings which extend inbd from the nacelle, through the pylon, and attach to the fuselage structure.

There are two basic design approaches for ensuring the structural integrity of an airplane during its service life: the "safe-life" and "fail-safe" concepts. The design of the Sabreliner incorporates the concept of "safe-life." To clarify the differences in the two basic approaches, definitions are presented in the following paragraphs.

A "safe-life" airplane structure is defined as being capable of withstanding, without failure, the repeated loads of variable magnitudes expected during the defined service life of the airplane. "Safe-life" is proved by either analysis or tests that include all scatter factors on material and load spectrums. Because of the proof of "safe-life," alternate load paths are not necessarily deliberately provided.

The concept of "fail-safe" design differs in that alternate load paths are specifically provided and methods for limiting crack propagation are employed.

FLIGHT LIMITS WITH RESTRICTED-LIFE REPAIRS

STRUCTURAL IDENTIFICATION

FLIGHT LIMITS WITH STRUCTURAL DAMAGE

When a structurally damaged airplane is to be flown to a repair facility "as is" or with restricted-life repairs incorporated, the following flight restrictions must be observed:

1. Maximum load factor for symmetrical flight is +1.5G and -0.5G.
2. Maximum load factor for roll conditions is +1.3G and -0.5G, with no more than one-half aileron deflection.
3. The flight is made at a maximum airspeed of 225 KIAS or Mach 0.50, whichever is lower. Airspeed should be reduced to 150 KIAS when entering turbulent air.
4. Maximum flight altitude is 30,000 ft.
5. No intentional abrupt maneuvers of any type are to be performed.
6. Horizontal stabilizer trim may be used only to trim the airplane (reduction in required pilot effort) in level flight, scheduled climbs, letdowns, landings, and takeoffs. The horizontal stabilizer must not be used to maneuver the airplane or in conditions resulting in an increase in pilot effort.
7. For landing conditions, the sinking speed is to be minimized, particularly when damage has affected landing gear carry-through structure. The most critical regions for landing gear loads are the nose gear beam, main gear attach region of the rear spar, and main gear supporting wing rib.
8. If the damage is in the region of the fuselage affected by cabin pressure, the flight must be made *without* pressurization.
9. A placard, clearly stating the foregoing flight limitations, must be conspicuously posted in the cockpit.

FLIGHT LIMITS WITH WINDSHIELD DAMAGE

The following flight restrictions apply to flights with windshield damage within the limits defined in 56-00-20.

1. Do not use windshield heat.
2. Maximum airspeed is 200 KIAS.
3. Maintain altitude of 6000 ft above local ground level.
4. Maintain the minimum altitude per above condition three as permitted by weather and other flight conditions.
5. A placard clearly stating the foregoing flight restrictions must be conspicuously posted in the cockpit.

INVESTIGATION, CLEAN-UP, AND AERODYNAMIC SMOOTHNESS

ALLOWABLE DAMAGE

DAMAGE CLASSIFICATION

In this manual, damage is broken down into the following four basic types:

- Negligible Damage
- One-time Flight Damage
- Repairable Damage
- Parts Replacement Damage

Negligible Damage

Negligible damage is damage which can be permitted to remain "as is," or which may be corrected by a simple procedure, without restricting flight. In most cases, a corrective action must be taken to keep the damage from spreading. Frequent inspection of areas with negligible and minor damage is necessary to ensure that the damage does not spread. Limitations regarding the extent of negligible damage vary in different locations throughout the airplane. These limitations are shown on the illustrations of negligible damage for the various components. The following are examples of negligible damage:

Dents

Dents which are generally smooth and without abrupt changes in contour may be considered negligible damage and left "as is" or bumped back to mold line.

Scratches and Nicks

A damage which does not go through the protective coating of the material, or through the cladding on alclad sheet, is not considered a scratch.

Negligible Corrosion Damage

Corrosion damage which does not exceed the prescribed limits for scratches and nicks may be considered negligible if the corrosion is cleaned out and the area is chemical-film-treated. (Refer to Sabreliner Corrosion Control Manual, Report No. SR-76-023 for corrosion repair information.)

Cracks

This type of damage usually originates at edges, holes, or points where concentrated loads are applied or abrupt changes occur in the cross-sectional area. All cracks should be stop-drilled at each end.

Holes

Cleaned-up holes that do not reduce the cross-sectional area of a material enough to introduce prohibitive stress, or which do not interfere with the function of a component (including pressurized areas and fueltight areas), may be considered negligible.

One-time Flight Damage

One-time flight damage is damage which can be left "as is" or requires only minor repairs to allow the airplane to be flown to a repair facility.

Repairable Damage

Repairable damage is damage which may be repaired so as to make the strength of the repaired structure equal to, or greater than, that required to maintain the structural capability of the airplane.

Parts Replacement Damage

A damaged component must be replaced if the location or the extent of damage makes it impractical to repair. When a damaged component or part is replaced, care should be taken to avoid damage to adjacent or attaching structure.

DAMAGE TYPES AND CAUSES

There are many causes and degrees of damage that may occur to an airplane. However, for purposes of description, some of the causes are:

- Collision or Impact Damage
- Stress Damage
- Fatigue Damage
- Corrosion Damage
- Erosion Damage
- Overheat Damage

Collision or Impact Damage

This type of damage varies from minor damage, such as a small hole or dent, to extensive damage, such as torn, crushed, or burned skin and structural members, and misalignment of the airplane. Damage such as this can occur anywhere on the airplane.

Stress Damage

This type of damage generally consists of loosened, sheared, or popped fasteners, wrinkled skin or webs, and cracked or deformed structural members. This type of damage is caused by abnormal stresses imposed upon the members.

ALLOWABLE DAMAGE (Continued)

Fatigue Damage

This type of damage generally consists of small cracks which are caused by vibration, "oil cans," and variable loads imposed on skin, fittings, and load-bearing members where fittings are attached. Damage of this type occurs more frequently as the operation time of the airplane accumulates.

Corrosion Damage

Corrosion may be defined as the gradual chemical or electromechanical attack on a metal by atmosphere, moisture, and other agents. The types of corrosive attack most commonly encountered are ordinary corrosion, resulting in a uniform deterioration of pitting attack on the surface; intergranular corrosion, resulting in a grain boundary attack; and stress corrosion and galvanic corrosion, resulting in the deterioration of the more active of two dissimilar metals in contact. Corrosion products from the deterioration of the more active metal will sometimes corrode the other dissimilar metal (for instance, magnesium and aluminum). Corrosion caused by foreign materials such as battery acid and fire-extinguishing agents may be encountered under certain conditions. When corrosion of any type is discovered, only sound judgment can determine whether or not the entire part should be replaced, the area reworked, or the corroded area cut out and a new section spliced in. (Refer to Sabreliner Corrosion Control Manual, Report No. SR-76-023 for corrosion repair information.)

Ordinary Corrosion

Ordinary corrosion may be recognized by a dulling or pitting of the surface, accompanied by white powdery deposits on aluminum and by a reddish rust coating on steel. Corrosion cannot always be detected by a visual examination alone, but may sometimes be discovered under paint where the paint flakes off under pressure.

Intergranular Corrosion

Intergranular corrosion is corrosion occurring along the grain boundaries of the material resulting from a difference in corrosion (or electrochemical) potential between the grain boundary material and the matrix (or center of the grains). This corrosion cannot be readily recognized during a surface examination until actual failure of the material. This failure then shows up much as a crack might appear.

Stress Corrosion

This type of corrosion occurs as a result of the susceptibility of materials to intergranular corrosion combined with presence of internally or externally applied stresses such as residual stresses developed from quenching, welding, severe forming, or externally applied severe stress.

Galvanic Corrosion

In the presence of moisture, when two different metals are in contact, an electric current flows from one to the other, resulting in corrosive attack on one of the materials. This is similar to the action that takes place within a common storage battery. In galvanic corrosion, the more active of the two dissimilar metals serves as the anode, the moisture becomes the electrolyte, and the less active metal acts as the cathode. The more active of the two metals suffers the corrosive attack.

Corrosive Effects of Dry Chemical Powder (Sodium Bicarbonate)

Dry chemical powder is a specially prepared grade of sodium bicarbonate. When sodium bicarbonate is heated, it decomposes and releases carbon dioxide gas and water vapor. The decomposed product is sodium carbonate (soda ash).

In the dry state, sodium bicarbonate is harmless and sodium carbonate is relatively so. In the wet state (in solution with water), sodium bicarbonate is mildly corrosive to most aircraft metals, and sodium carbonate is extremely caustic and will rapidly attack most aircraft metals.

Corrosive Effects of Mechanical Foam

The agent combined with water to produce foam is a harmless vegetable compound. The only corrosive action of this combination is that caused by the water used.

Corrosive Effects of Chlorobromomethane

Chlorobromomethane is highly corrosive. It evaporates rapidly, but if any of this substance is trapped in pockets, it must be cleaned out immediately.

Corrosive effects of Dibromodifluoromethane (DBF), Carbon Dioxide, Carbon Tetrachloride, and Monobromotriflouromethane (CB_rF_3).

These fire-extinguishing agents evaporate rapidly and are relatively harmless.

Erosion Damage

Erosion damage is usually encountered on reinforced glass-fabric components such as antennas, radomes, and wing tips. While this material is resistant to rain, weather, and aging, it may be eroded by hail, sharp objects, flying stones, or sharp blows.

Overheat Damage

Overheat damage is most likely to occur in the engine nacelle structure and skins. Overheat damage may be detected by skin and web buckles, canning, and primer discoloration.

INVESTIGATION, CLEAN-UP, AND AERODYNAMIC SMOOTHNESS

REPAIR

CLASSIFICATION OF REPAIRS

In this manual, repairs are broken down into two types as follows:

- Standard (permanent) Repairs
- Special (restricted-life) Repairs

Standard Repairs

Standard repairs are designated as "Class A" and "Class B."

Class A Repairs

Class A repairs are those which put the airplane, both structurally and aerodynamically, back to its original configuration. Generally, these repairs are one of the following types:

1. A splice across, or completely encircling, the damaged area with splice material of the same type as the original.
2. Repair made by splicing in a section of new material to replace the damaged material.
3. Repair made by replacing the damaged part or assembly with a new one.

Class B Repairs

Class B repairs provide the structural integrity of Class A repairs but sacrifice appearance and aerodynamic cleanness. Class B repairs should not be installed on aerodynamically critical areas. (Refer to AERODYNAMIC SMOOTHNESS 51-10-60.)

Restricted-Life Repairs

Restricted-life repairs are repairs that will enable a damaged airplane to be flown (under restricted conditions) to a place where permanent repair can be made.

For flight limitations with restricted-life repairs incorporated, refer to 51-00-10.

AIRFRAME AND MATERIAL INSPECTION

STRUCTURAL IDENTIFICATION

GENERAL

The primary structure of an airplane is designed to resist variable forces imposed upon it in operation. The structure must distribute these forces to the principal structural strength members of the wing and fuselage. When a member has been damaged, a complete and thorough inspection must be made. This inspection should include the damaged structural member and the adjacent or attaching members. It is possible that the damaging force might have been transmitted over the surrounding structure, causing secondary damage in areas other than the primary damage area. Should the secondary damage not be discovered, forces distributed through the structure during normal airplane operations may cause this structure to fail. Careful investigation must be made of all structure across which the forces must travel, and parts must be checked for possible misalignment. (An aid in the search for secondary damage is presented in "LOAD AND BUCKLE PATTERNS.")

PRELIMINARY EXTERNAL INSPECTION

A great deal may be learned about the condition of the internal structure of an airplane by a careful examination of the skin on the wings, stabilizers, and fuselage. Some indications might be buckle patterns on surface skin of stabilizers and along the sides, top, and bottom of fuselage. Loose, tipped, or sheared fasteners, and joggles or bulges in the skin at structural joints or where heavy fittings are attached, indicate that a thorough inspection of the underneath structure should be made. Inspect fairings and other nonstructural parts for tears, cracks, buckles, and misalignment. Any unusual appearance of these parts is reason for a close inspection of the structures they cover.

Check also the fit of doors, covers, canopy, etc. Anything unusual about their fit or alignment may indicate a warped or sprung structure, and is cause for inspection of that structure.

When possible, actuate control surfaces, flaps, speed brake, etc. Observe these units closely throughout their travel. They should operate freely and without binding or chafing. Check the units in the zero or closed positions for proper alignment with adjacent members.

DETAILED VISUAL INSPECTION

Carefully inspect all areas adjacent to the obvious damage. Inspect forgings and other machined parts for cracks and for evidence of their having been moved. This can often be done by observing the paint around the edges, by tipped bolt or rivet heads, or by a slight space at the edge of faying surfaces. When possible, remove two bolts from a suspected fitting and examine bolts for evidence of shearing or bending. Check boltholes for elongation.

Inspect supporting structures for buckling, warpage, and joggles. Check for sheared, loose, or tipped fasteners. Alignment with adjacent members is also important. Using a straightedge, check known flat areas such as spar webs, frame webs, and bulkheads. Any deviation should be thoroughly investigated.

When an airplane has been damaged, or damage is suspected, a close examination is justified for all areas where major components are joined or where heavy weights are supported. The principal areas of this nature, with their supporting structures, are as follows:

- Wing-to-fuselage attachments
- Vertical stabilizer attachments
- Rudder hinge
- Landing gear trunnions and braces
- Pylon and nacelle attachments
- Engine mounts

Continue inspection throughout disassembly and repair of airplane. During this time, indications of unsuspected damage are often revealed. When new parts being installed do not fit properly, find out why. It may be because of damage which has been overlooked.

LOAD AND BUCKLE PATTERNS

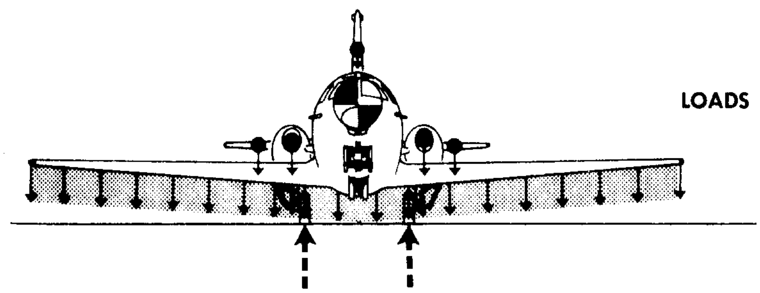
STRUCTURAL IDENTIFICATION

GENERAL

The initial load and possible resultant buckle patterns shown in figure 1 are typical of those frequently occurring in airplane accidents and high-G pull-outs. The initial load or point of contact is represented by a broken arrow. The directions, and in some instances magnitudes, of the resultant inertia loadings are indicated by solid arrows within shaded areas.

When the load and buckle pattern diagrams are used as a guide in determining which areas should be more carefully inspected, it must be remembered that each illustration represents but one given load. In any given accident, there may be secondary loadings which would result in compound load and possible buckle patterns. An example of this could be when an airplane makes a hard two-wheel landing, runs off the runway during roll-out, and is spun around by contact with another object, or because one wheel sinks into a soft surface.

The load and buckle pattern diagrams present only a few of the possible conditions. However, they do show how an external load applied to one area is transferred throughout the airframe. A careful analysis of the type of accident or unusual maneuver, and the probable resultant loadings, is important in performing a thorough inspection.

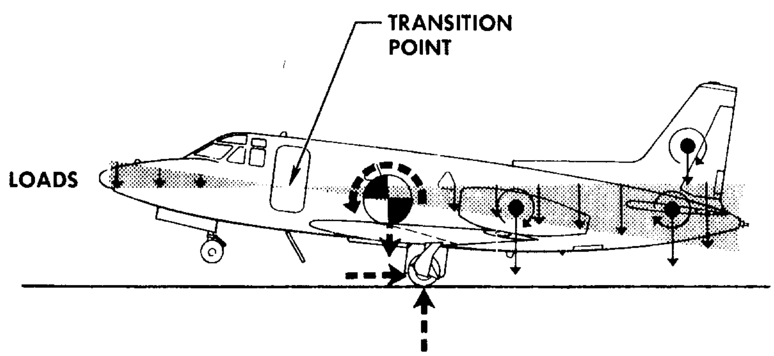


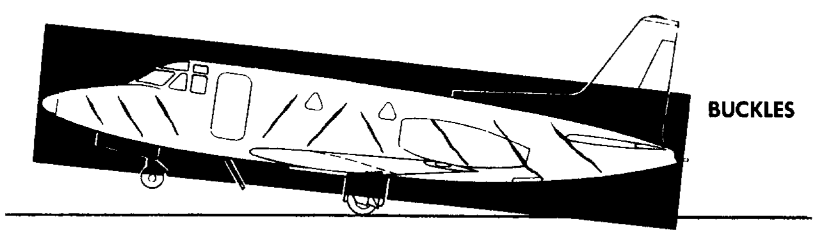
LOAD PATTERNS

HARD TWO-WHEEL (MAIN GEAR) LANDING

- - - - - → INITIAL LOADS

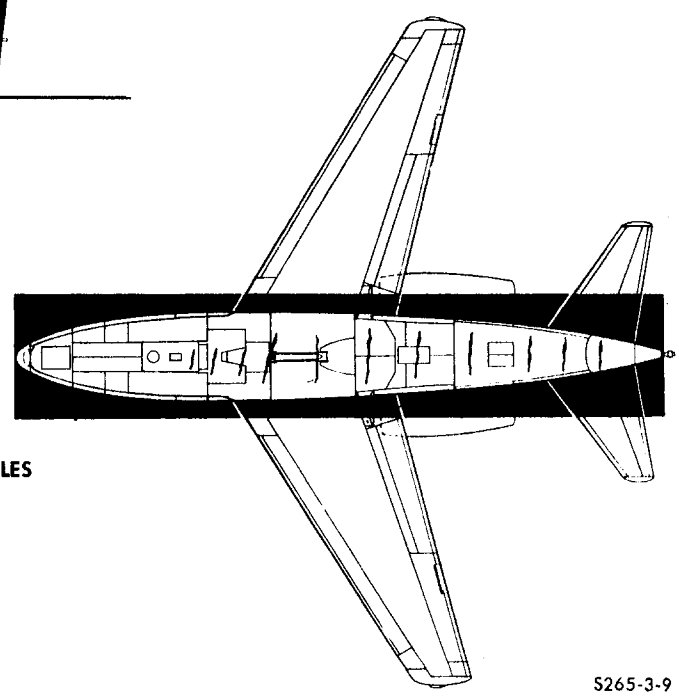
———→ RESULTANT INERTIA LOADING DISTRIBUTION OF AIRFRAME. LOADS ARE THE PRODUCT OF THESE LOADING INTENSITIES AND THE LOCAL DISTRIBUTED MASS (WEIGHT), COMBINED WITH THE INITIAL EXTERNAL LOADS.





BUCKLE PATTERNS

HARD TWO-WHEEL (MAIN GEAR) LANDING

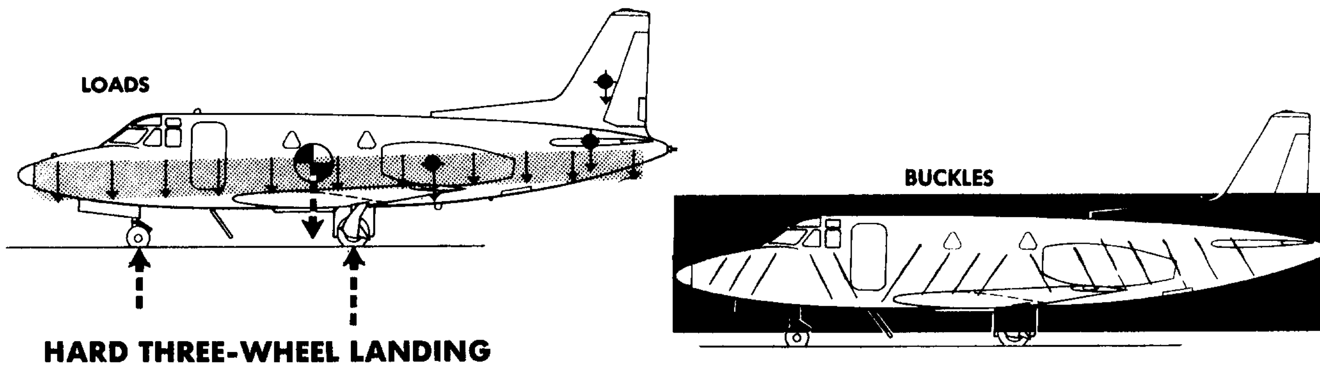


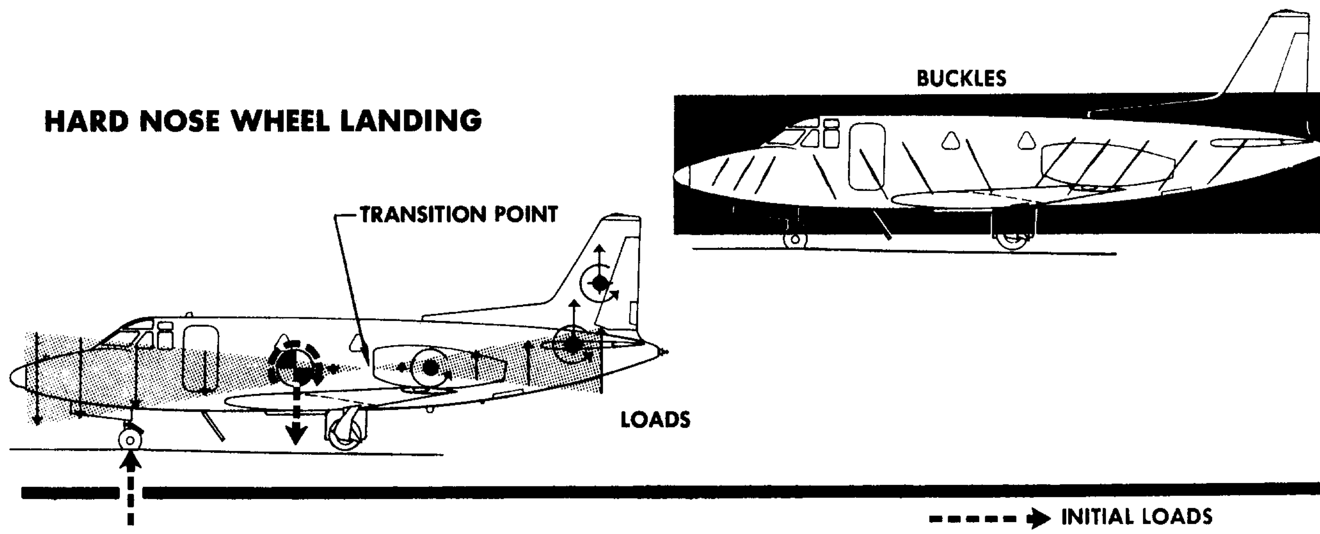
NOTES

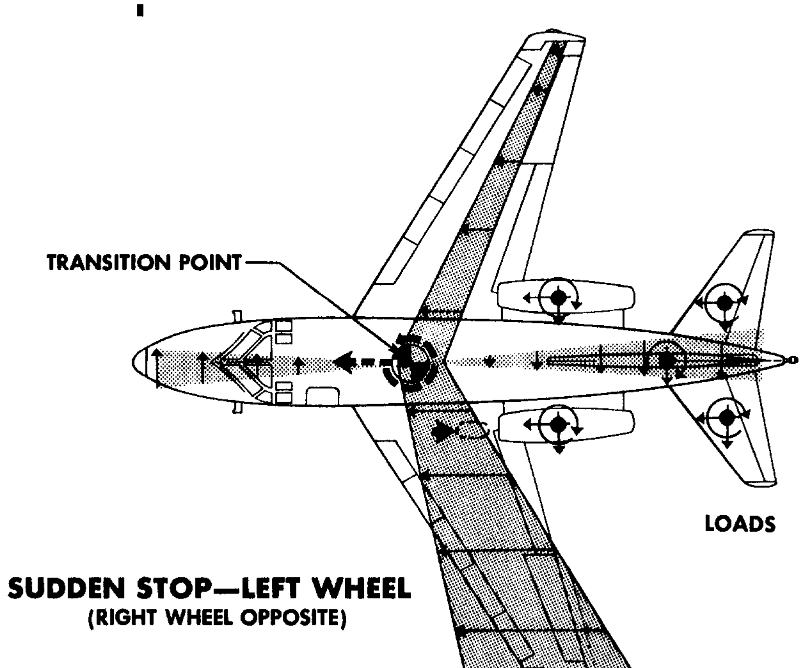
- BUCKLE PATTERNS SHOWN IN THE DIAGRAMS INDICATE THE DIRECTIONS OF THE BUCKLES THAT WOULD TEND TO FORM IN THE SKIN AS A RESULT OF THE LOADS IMPOSED IN A HARD TWO-WHEEL LANDING
- LOCATION OF TRANSITION OF BUCKLE DIRECTION MATCHES LOADING TRANSITION POINT. THIS POINT MAY BE IN A DIFFERENT LOCATION FOR EACH LANDING, DEPENDING ON GROSS WEIGHT CG LOCATION, SINKING SPEED, ANGLE FROM HORIZONTAL ETC.
- BUCKLES SHOWN ARE FOR FUSELAGE ONLY.

S265-3-9

Load and Buckle Patterns
Figure 1 (Sheet 1 of 4)







- - - - -▶ INITIAL LOADS

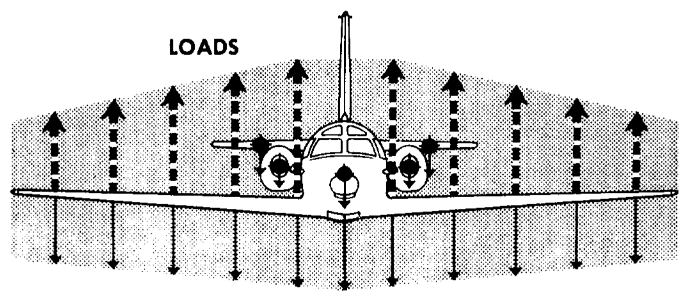
———▶ RESULTANT INERTIA LOADING DISTRIBUTION ON AIRFRAME. LOADS ARE THE PRODUCT OF THESE LOADING INTENSITIES AND THE LOCAL DISTRIBUTED MASS (WEIGHT), COMBINED WITH THE INITIAL EXTERNAL LOADS.

NOTES

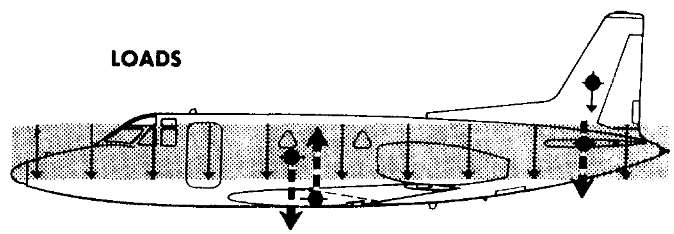
- BUCKLE PATTERNS SHOWN IN THE DIAGRAMS INDICATE THE DIRECTIONS OF THE BUCKLES THAT WOULD TEND TO FORM IN THE SKIN AS A RESULT OF THE LOADS IMPOSED IN THE LANDING CONFIGURATIONS SHOWN.
- LOCATION OF TRANSITION OF BUCKLE DIRECTION MATCHES LOADING TRANSITION POINT. THIS POINT MAY BE IN A DIFFERENT LOCATION FOR EACH LANDING DEPENDING ON GROSS WEIGHT, CG LOCATION, SINKING SPEED, ANGLE FROM HORIZONTAL, ETC.
- BUCKLES SHOWN ARE FOR FUSELAGE ONLY.

S265-3-10

Load and Buckle Patterns
Figure 1 (Sheet 2 of 4)



HIGH "G" PULL-OUT

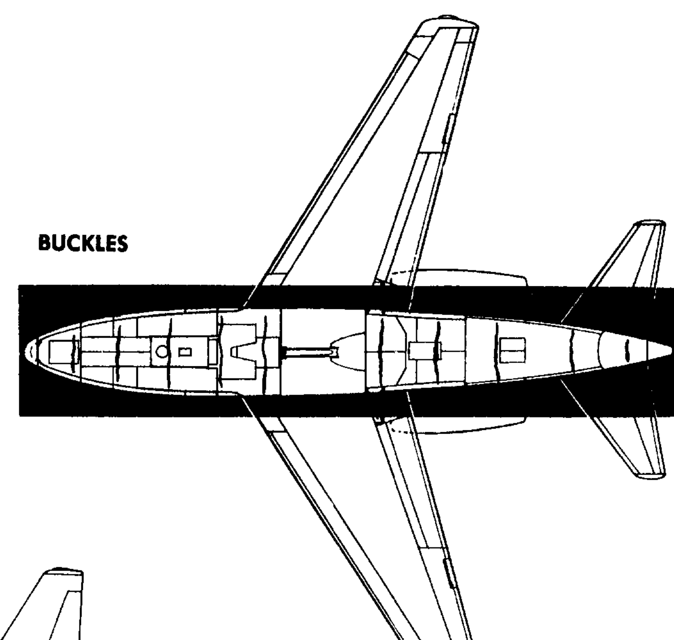


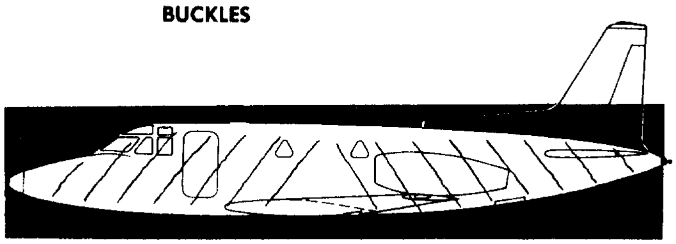
INITIAL LOADS

RESULTANT INERTIA LOADING DISTRIBUTION ON AIRFRAME. LOADS ARE THE PRODUCT OF THESE LOADING INTENSITIES AND THE LOCAL DISTRIBUTED MASS (WEIGHT), COMBINED WITH THE INITIAL EXTERNAL LOADS.

NOTES

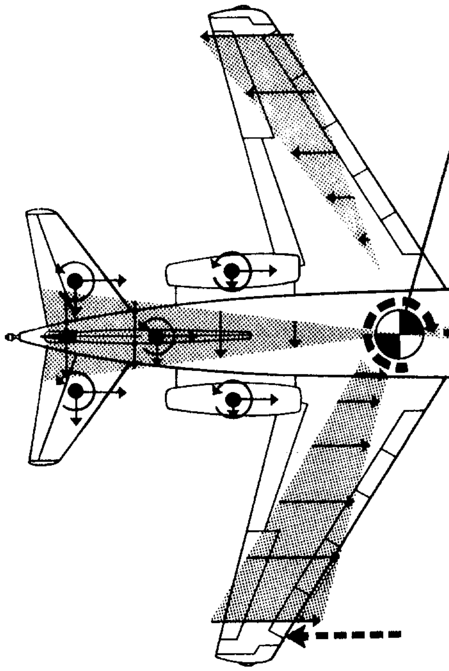
- BUCKLE PATTERNS SHOWN IN THE DIAGRAMS INDICATE THE DIRECTIONS OF THE BUCKLES THAT WOULD TEND TO FORM IN THE SKIN AS A RESULT OF THE LOADS IMPOSED IN A HIGH G PULL-OUT.
- BUCKLES SHOWN ARE FOR FUSELAGE ONLY.





S265-3-11

Load and Buckle Patterns
Figure 1 (Sheet 3 of 4)



- - - - - ➔ INITIAL LOADS

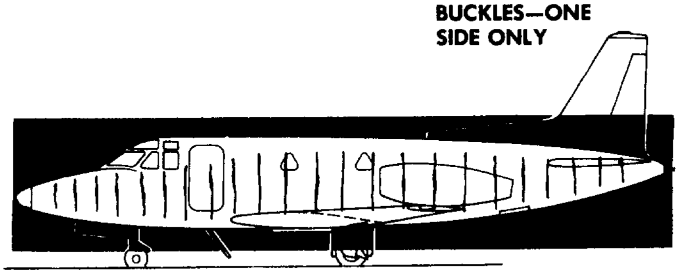
———➔ RESULTANT INERTIA LOADING DISTRIBUTION ON AIRFRAME. LOADS ARE THE PRODUCT OF THESE LOADING INTENSITIES AND THE LOCAL DISTRIBUTED MASS (WEIGHT), COMBINED WITH THE INITIAL EXTERNAL LOADS.

SUDDEN STOP—RIGHT WING
(LEFT WING OPPOSITE)

NOTES

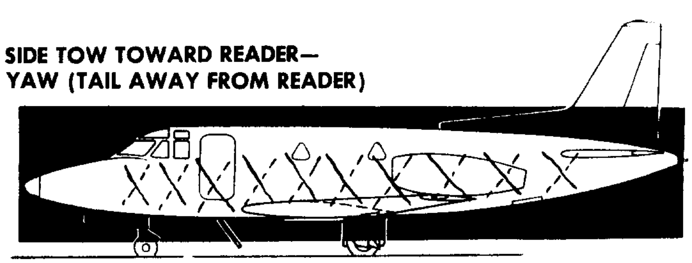
- BUCKLE PATTERNS SHOWN IN THE DIAGRAMS INDICATE THE DIRECTIONS OF THE BUCKLES THAT WOULD TEND TO FORM IN THE SKIN AS A RESULT OF THE LOADS IMPOSED UNDER THE CONDITIONS GIVEN.
- BUCKLES MAY BE OF EITHER TYPE SHOWN, OR A COMBINATION OF BOTH.
- BUCKLES SHOWN ARE FOR FUSELAGE ONLY.

COMPRESSION BUCKLES—ONE SIDE ONLY



**SIDE TOW TOWARD READER—
SIDE DRIFT TOWARD READER—
YAW (TAIL AWAY FROM READER)**

**SIDE TOW TOWARD READER—
YAW (TAIL AWAY FROM READER)**



DIAGONAL SHEAR BUCKLES ON BOTH SIDES, BUT OPPOSITE IN DIRECTION

SIDE DRIFT LANDING AND SIDE TOW

S265-3-12

**Load and Buckle Patterns
Figure 1 (Sheet 4 of 4)**

OVER-G, OVER PRESSURIZATION, AND HARD LANDING INSPECTION

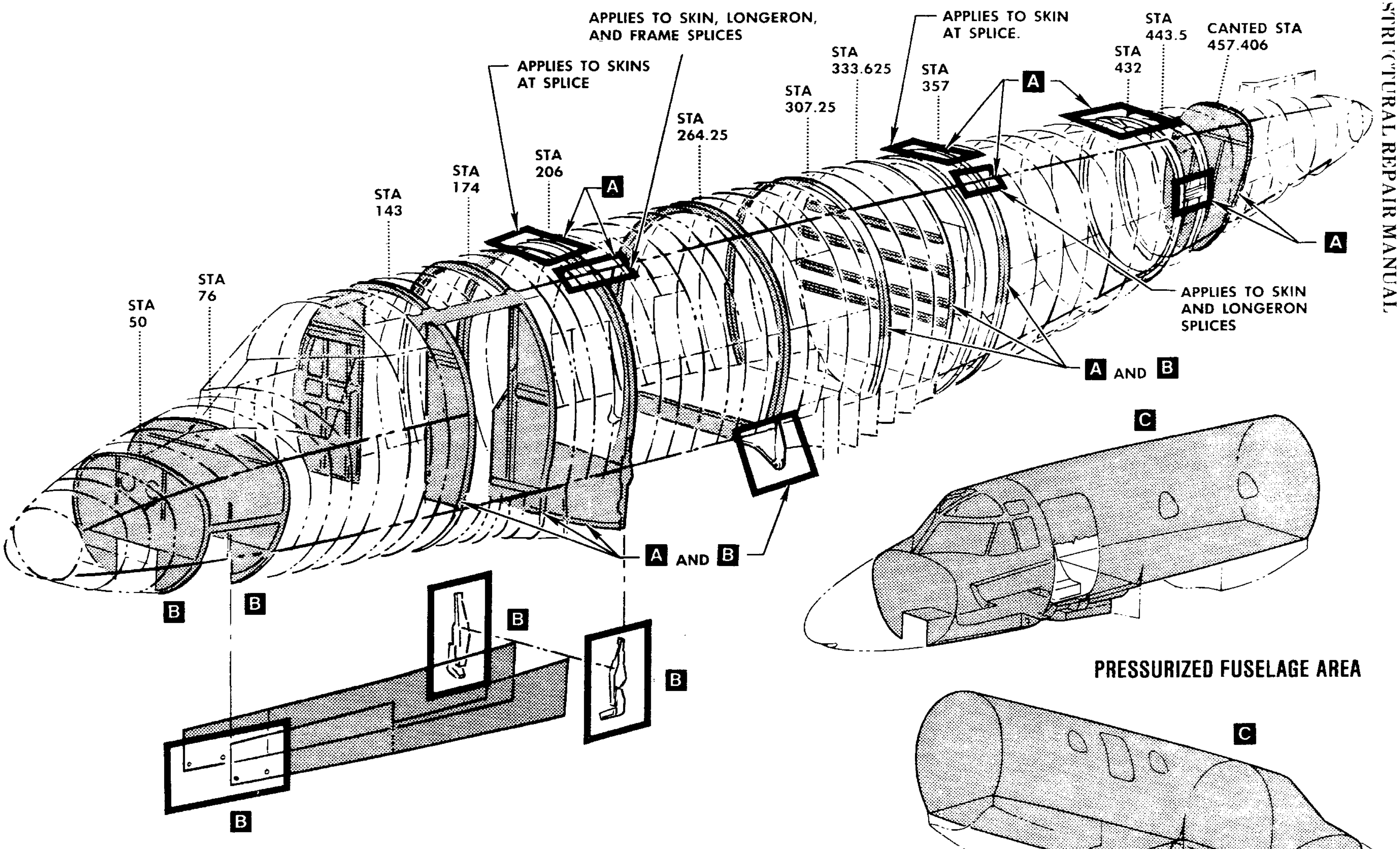
STRUCTURAL IDENTIFICATION

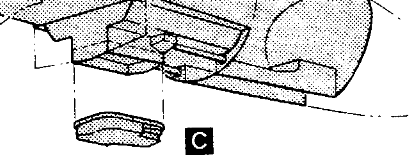
GENERAL

When an airplane has been subjected to overloads from over-G, overpressurization, or hard landing, a careful inspection of the structure should be made to determine whether damage was sustained. Inspection of the structure should be concentrated on finding fractures, or partial fractures (appearing as cracks), sheared or partially sheared fasteners, cracked or broken lugs (or other fittings), cracked or broken spars, longerons, etc.

EXCESSIVE LOAD FACTOR AND CRITICAL AREAS

Areas of major structural components that are critically loaded by high load factor from over-G, overpressurization, or hard landing are shown in figures 1 thru 9. Coding is used to indicate the overload condition for which each area is critical. Where there has been overpressurization, the entire pressurized section of the fuselage, including skins and attaching substructure, is critical, as pressure is equal on all areas.





NOTES

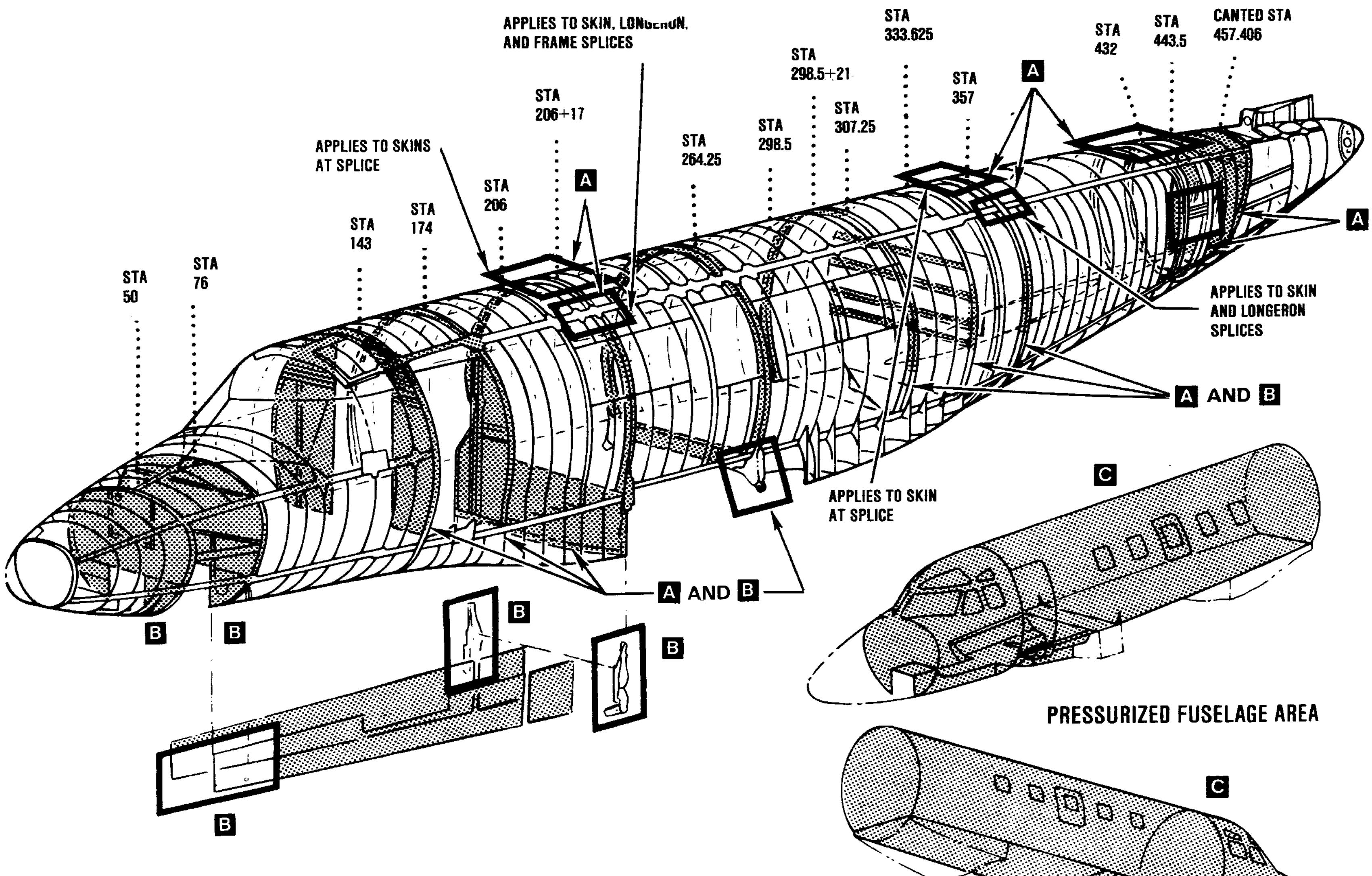
- SPECIAL ATTENTION SHOULD BE GIVEN TO THE ATTACHMENT OF CREW AND CABIN SEATS, GENERATORS, INVERTERS, BATTERIES, OXYGEN BOTTLES, AND BALLAST WEIGHING OVER 10 POUNDS.
- (shaded) INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.
- (box) PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

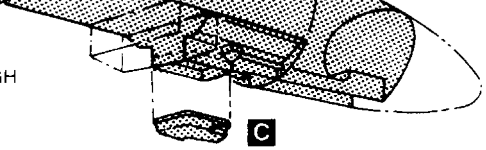
A AFFECTED BY OVER-G MANEUVERS (INCLUDES HIGH GUSTS).

B AFFECTED BY HARD LANDING.

C AFFECTED BY OVERPRESSURIZATION (INCLUDES SKIN AND SUBSTRUCTURE).

Excessive Load Factors and Critical Areas — Fuselage
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1





Excessive Load Factors and Critical Areas — Fuselage
Model NA 265-70, -80, -80A, and -80SC
Figure 2

NOTES

- SPECIAL ATTENTION SHOULD BE GIVEN TO THE ATTACHMENT OF CREW AND CABIN SEATS, GENERATORS, INVERTERS, BATTERIES, OXYGEN BOTTLES, AND BALLAST WEIGHING OVER 10 POUNDS.

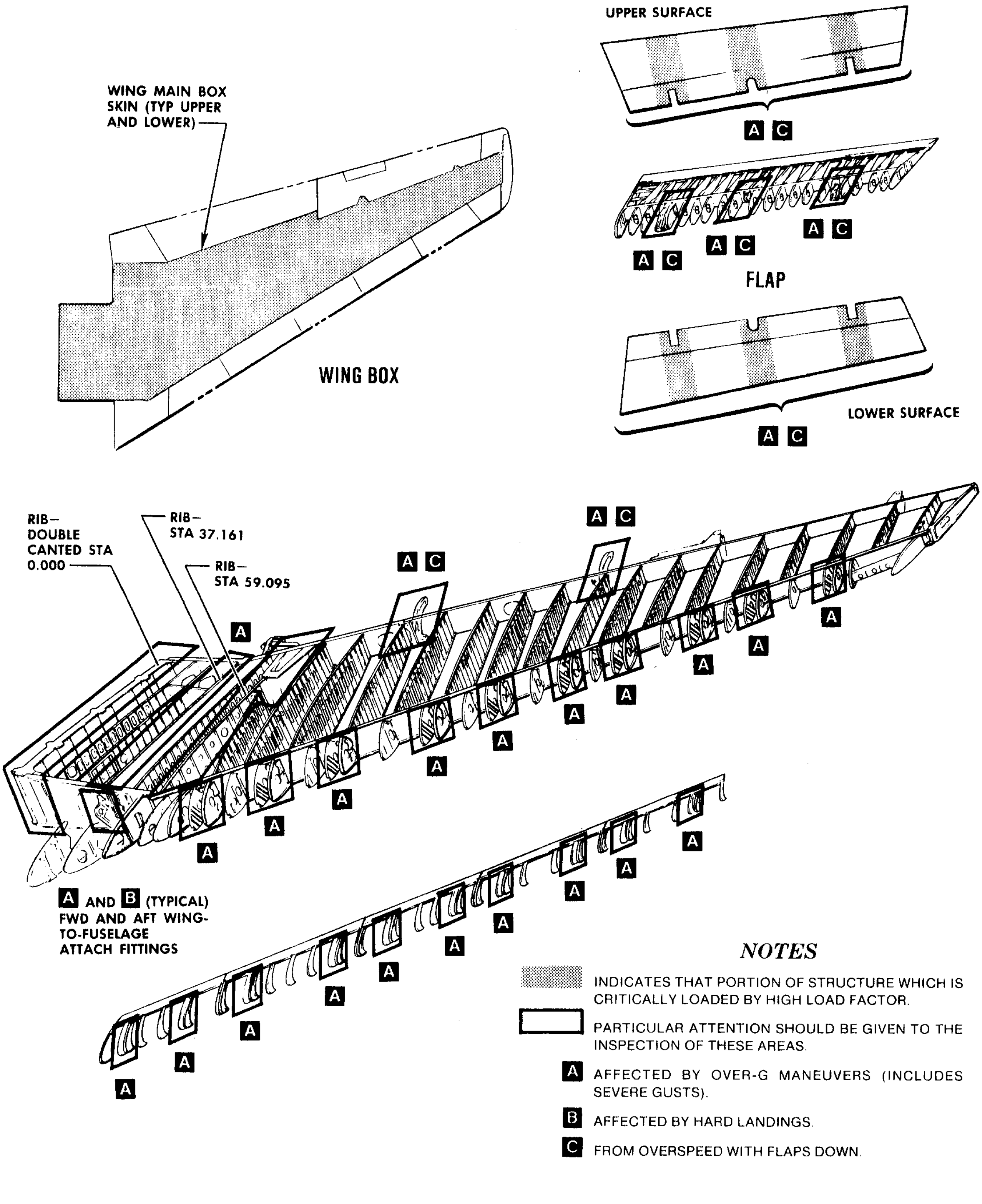
(shaded) INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.

(box) PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

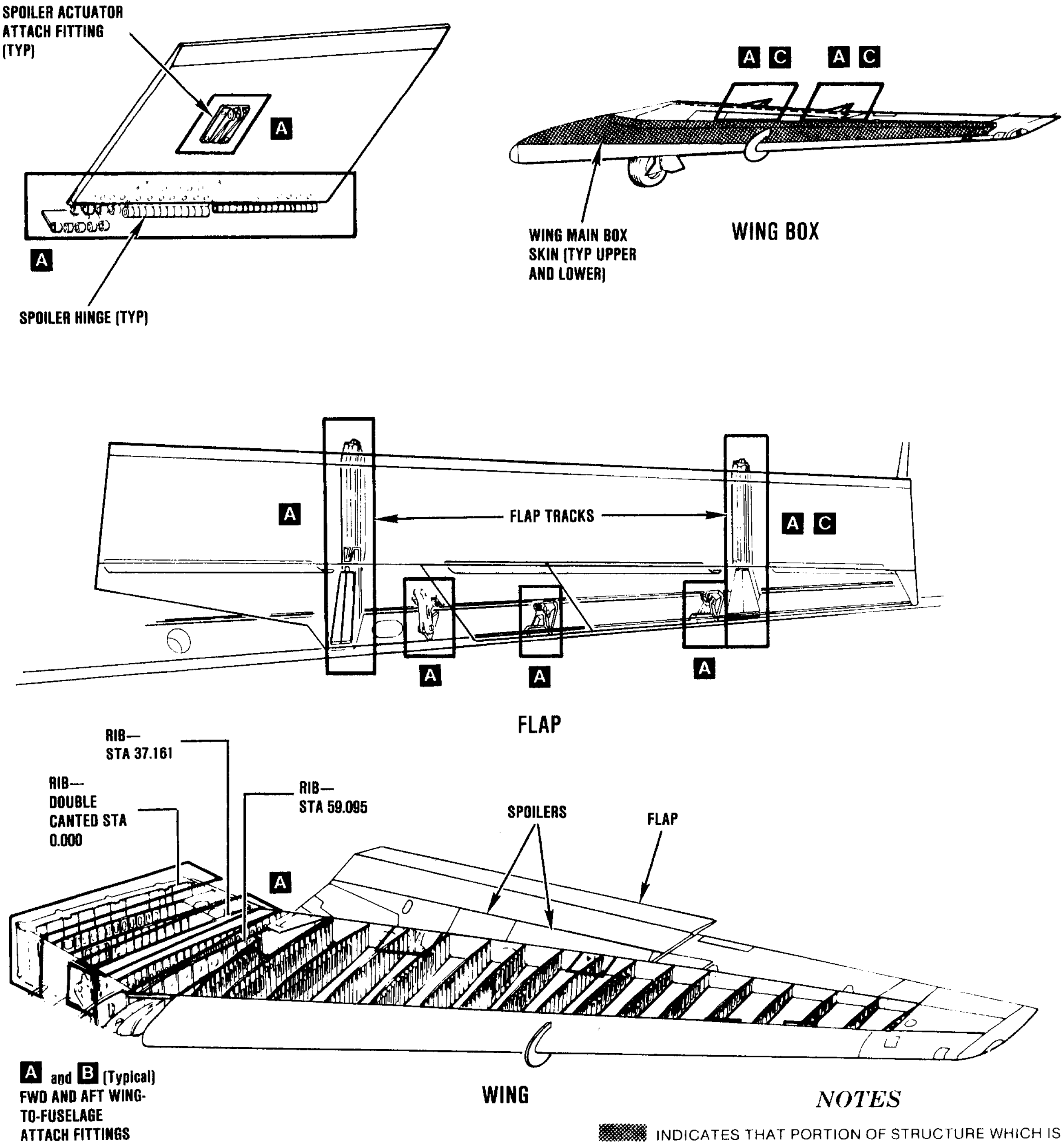
A AFFECTED BY OVER-G MANEUVERS (INCLUDES HIGH GUSTS).

B AFFECTED BY HARD LANDING.

C AFFECTED BY OVERPRESSURIZATION (INCLUDES SKIN AND SUBSTRUCTURE).



Excessive Load Factors and Critical Areas — Wing
Model NA 265-40, -60, -70, and -80
Figure 3



NOTES

▒ INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR

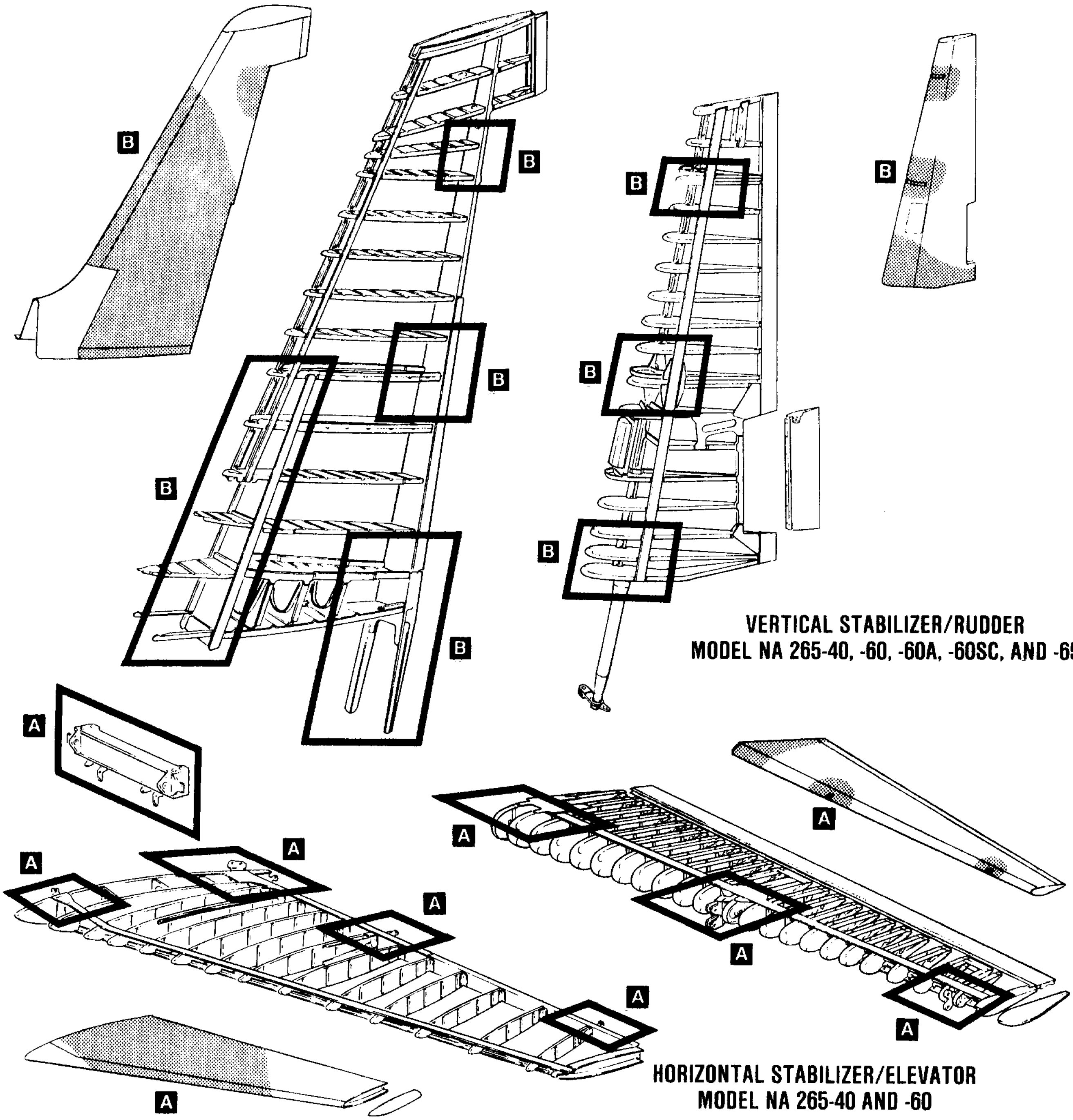
☐ PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

A AFFECTED BY OVER-G MANEUVERS (INCLUDES SEVERE GUSTS).

B AFFECTED BY HARD LANDINGS.

C FROM OVERSPEED WITH FLAPS DOWN.

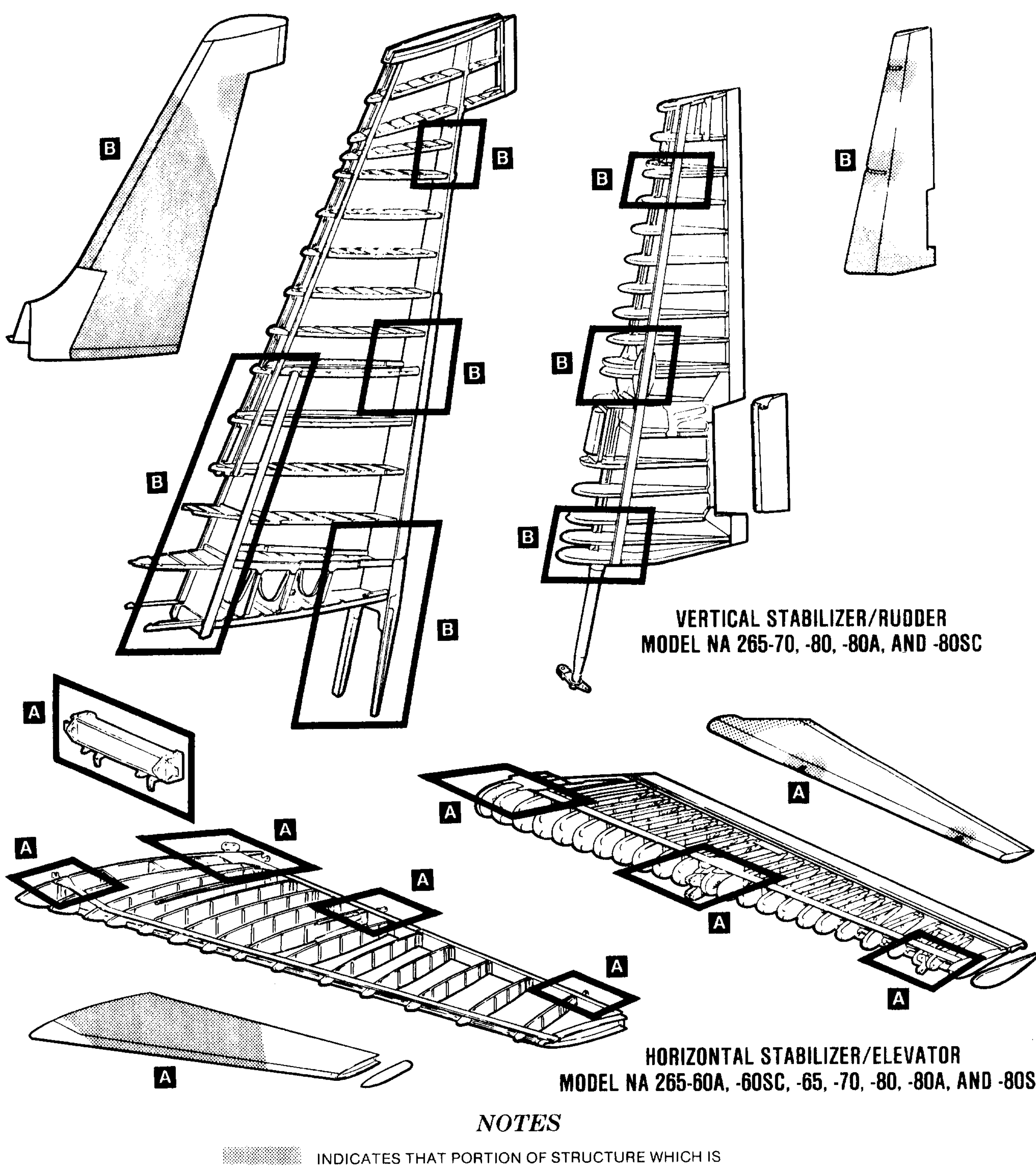
Excessive Load Factors and Critical Areas — Wing
Model NA 265-60A, -60SC, -65, -80A, and -80SC
Figure 4



NOTES

- (shaded) INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.
- (box) PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.
- A AFFECTED BY OVER-G MANEUVERS (INCLUDES SEVERE GUSTS).
- B AFFECTED BY EXCESSIVE YAW.

Excessive Load Factors and Critical Areas — Empennage
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 5



NOTES

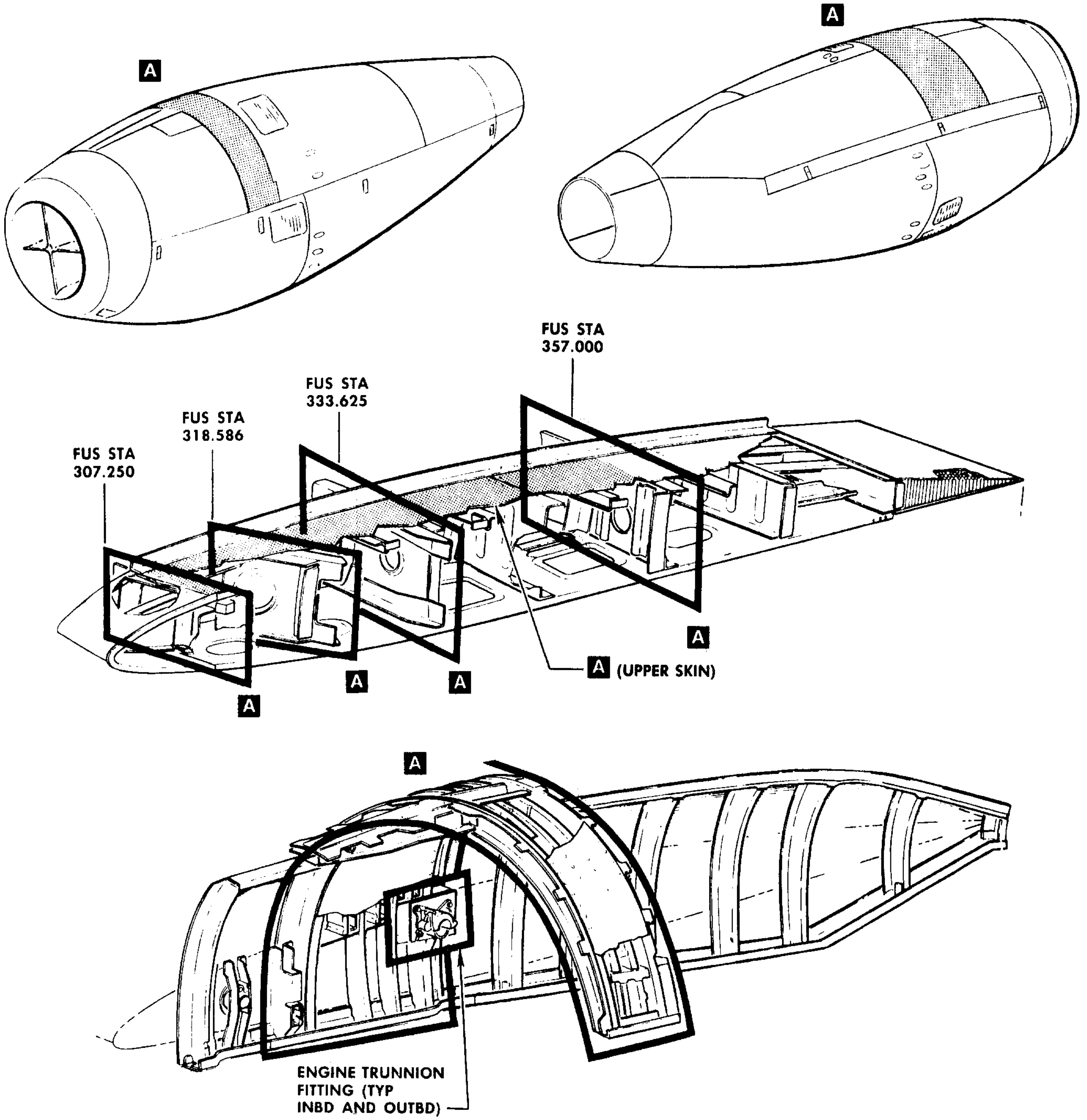
(shaded area) INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.

(box outline) PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

A AFFECTED BY OVER-G MANEUVERS (INCLUDES SEVERE GUSTS).

B AFFECTED BY EXCESSIVE YAW.

Excessive Load Factors and Critical Areas — Empennage
Model NA 265-60A, -60SC, -65, -70, -80, -80A, and -80SC
Figure 6



NOTES

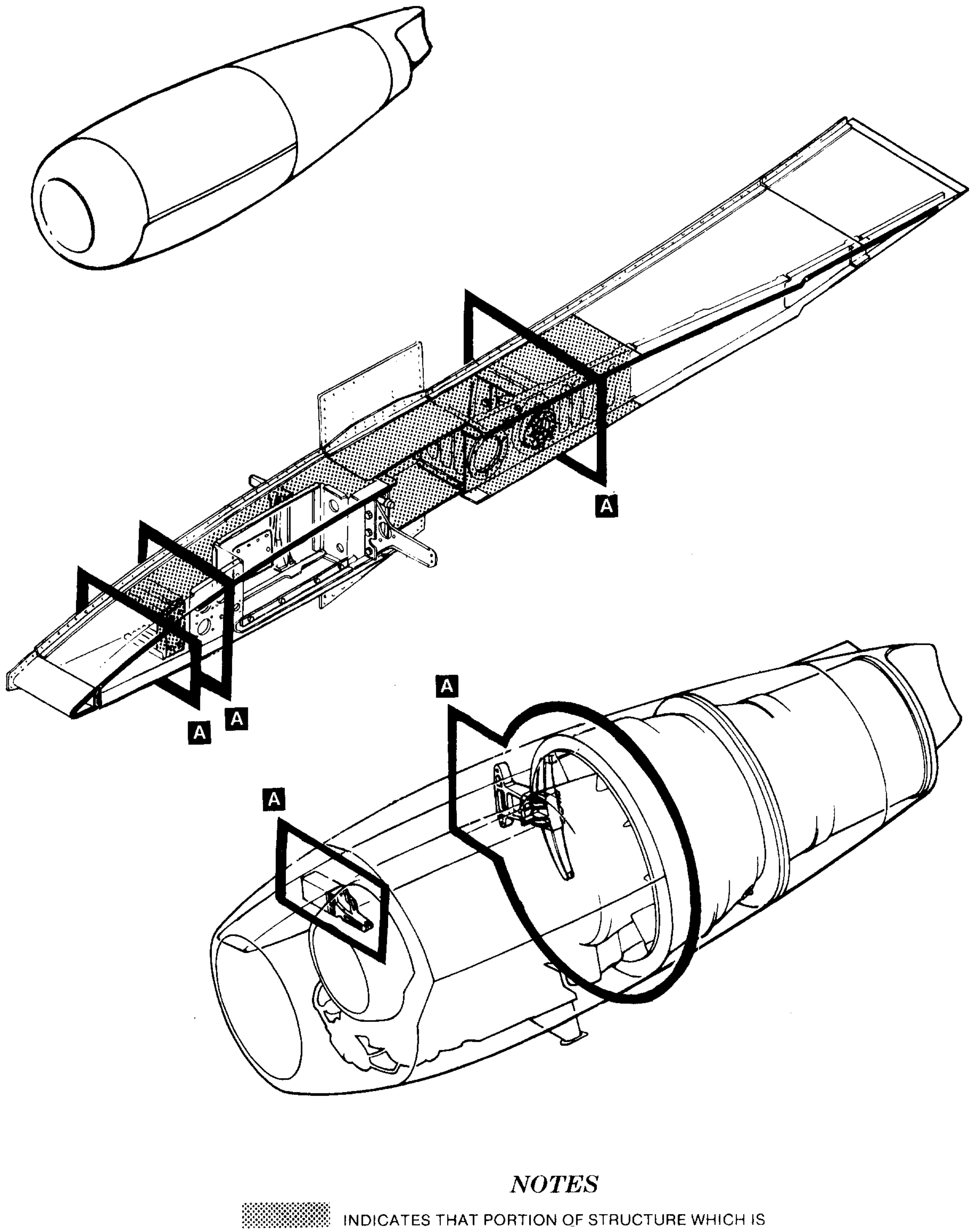
- IF FAILURE OF ANY TYPE IS FOUND AT FS 33.625, INTERNAL INSPECTION MUST BE MADE OF PYLON-TO-NACELLE ATTACHMENTS AT STATIONS 318.586 AND 33.625. (ATTACHMENTS ARE BETWEEN INNER AND OUTER SKINS IN NACELLE STRUCTURE.)

A AFFECTED BY OVER-G MANEUVERS (INCLUDES SEVERE GUSTS)

(shaded) INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.

(boxed) PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

**Excessive Load Factors and Critical Areas — Pylon/Nacelle
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8 and -9)
Figure 7**



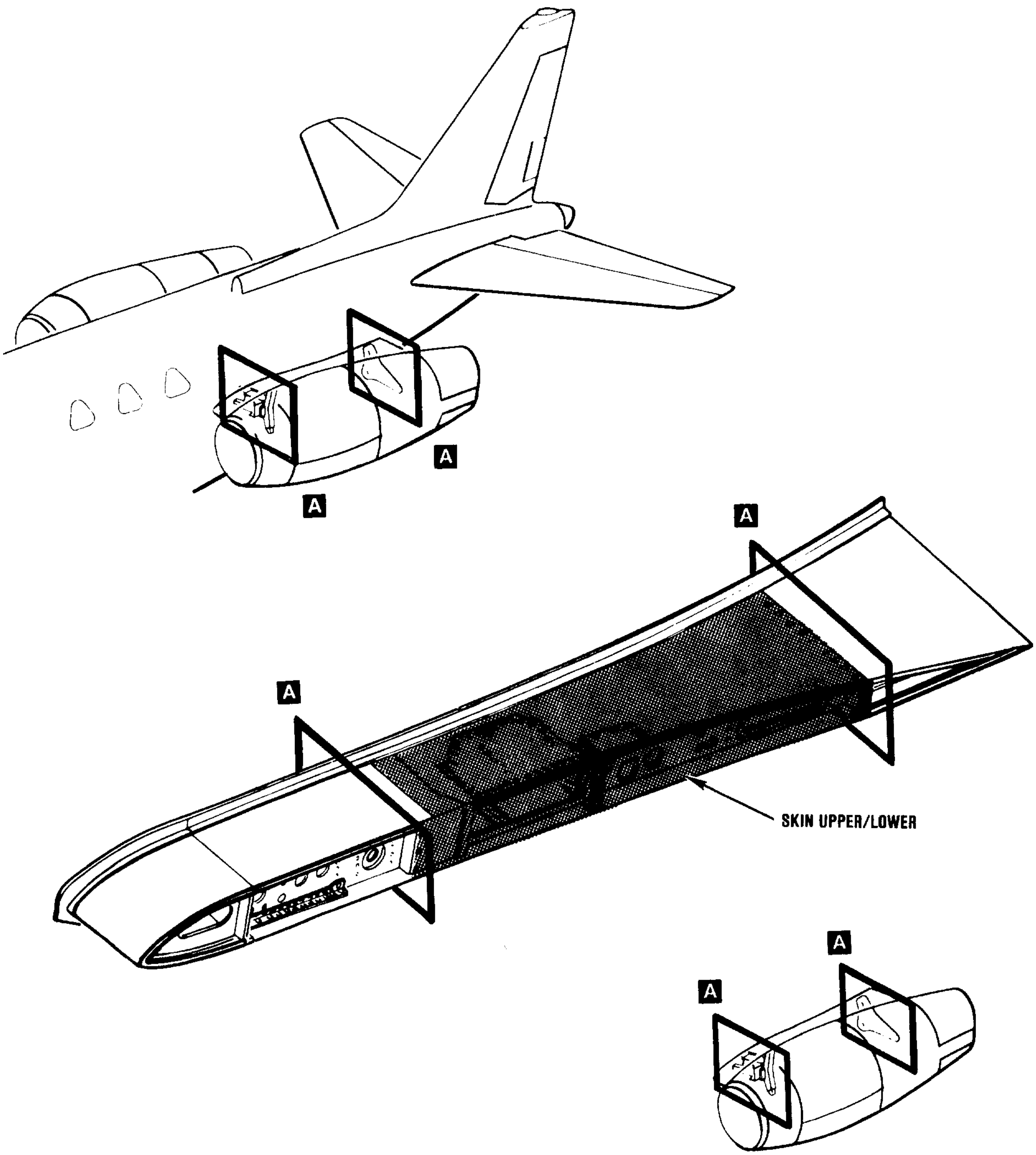
NOTES

INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.

PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

A AFFECTED BY OVER-G MANEUVERS (INCLUDES SEVERE GUSTS).

Excessive Load Factors and Critical Areas — Pylon/Nacelle
Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 8



NOTES

[shaded] INDICATES THAT PORTION OF STRUCTURE WHICH IS CRITICALLY LOADED BY HIGH LOAD FACTOR.

[box] PARTICULAR ATTENTION SHOULD BE GIVEN TO THE INSPECTION OF THESE AREAS.

[A] AFFECTED BY OVER-G MANEUVERS (INCLUDES SEVERE GUSTS).

Excessive Load Factors and Critical Areas — Pylon/Nacelle
Model NA 265-65
Figure 9

OVERHEAT INSPECTION

STRUCTURAL IDENTIFICATION

GENERAL

Three methods are used in checking airplane structures after overheating: Visual inspection for buckles, canning, and primer discoloration; hardness-testing of questionable parts with a portable or a stationary hardness tester; and tension-testing of specimens taken from areas of doubtful values.

VISUAL INSPECTION FOR BUCKLES, CANNING, AND PRIMER DISCOLORATION

In the visual inspection of an airplane, the search for buckles or canning is primarily concerned with the possibly weakened condition of primary internal structures. This is especially important when the overheating has been in the wing area. It is possible that an area unaffected directly by a fire may have been bent enough to receive a permanent set.

Large (or thick) aluminum parts, such as forgings, are not as quickly affected by heat as are thinner and smaller components. However, when heat has been great enough to damage the sheet and extruded parts, all heavy fittings in the area should be removed and hardness-tested. Similar parts from unaffected areas may be used for a comparison.

It is often necessary to remove sample discs from sheet-metal parts in order to test them on a bench-type hardness tester. Discs for this purpose should be removed with a one-in. hole saw. If the parts are to be retained in use, make repairs as directed in the applicable chapter of this manual.

Access hole covers in the overheated area are excellent samples for hardness sampling. They also provide an easily replaceable part for destructive testing.

Table 1 shows a tabular correlation of primer color, Rockwell hardness (clad removed), and ultimate tensile strength of 7075-T6 samples taken from an overheat-damaged airplane. It should be noted that tests were made on a relatively small number of specimens, and the limits on the scatter band shown are not necessarily those which could be found with a greater number of samples.

When tension bars from sheet-metal parts are taken for laboratory testing, the blanks removed should measure 1 x 7 in. However, pieces measuring 1 x 5 in. are acceptable. They should be cut with the long edges in line with the grain, whenever possible.

When parts or samples are sent to a laboratory for analysis, information as to the type and duration of the overheating should be included. Also, the part number, whether metal or alloy, grain direction, etc., should be included wherever determinable.

Determining the extent of overheat damage by zinc-chromate primer comparison can be reliable when used carefully. A clean sample of the primer known to be unaffected by heat is compared with chromate in the heated area. The sample should be from the same general area of the structure in question. The suspected area must be free of dirt, oil, and smoke.

Untinted chromate primer is a slightly greenish yellow. When exposed to about 300°F of heat for a few minutes, it turns a light tan color. Temperatures which discolor chromate primers will change the physical properties of 2024-T4, 7075-T6, 7178-T6, and 7079-T6 alloys. The 7000 Series alloys which are already in the T6, or artificially aged, condition are softened and weakened. The 2024-T4 is artificially aged and hardened until the temperature reaches 500°F; then, with increased heat, this metal also softens and weakens. When the temperature of 2024-T4 is raised to 300 to 500°F for a short period under uncontrolled conditions, as is the case in an airplane fire, the inherent corrosion-resisting properties are seriously affected.

Both 2024-T4 and 7000 Series alloys (T6 condition) are of questionable value and should be subjected to more accurate methods of testing when the slightest discoloration of the primer is evident.

HARDNESS-TESTING AND TENSION-TESTING

Reliable limits of correlation between hardness tests and tensile tests have been established for the 7000 Series aluminum alloys. Materials that meet the following minimum Rockwell "B" scale readings may be considered acceptable:

(1) 7075-T6 - R_B 88 (min)

(2) 7079-T6 - R_B 84 (min)

(3) 7178-T6 - R_B 89 (min)

Material that falls below the minimum should be replaced, or specimens should be removed from the areas with the lowest Rockwell readings and sent to a laboratory for tension tests.

Hardness test readings are not accurate indications of heat damage on 2024-T4 because of the corrosion factor. A quick heating to 300°F may not raise the hardness number above normal but will affect the corrosion resistance. Therefore, if chromate primer discoloration indicates that heat has affected the material, the material should be replaced or a specimen should be removed and sent to a laboratory for tension and corrosion-susceptibility tests.

STRUCTURAL IDENTIFICATION (Continued)

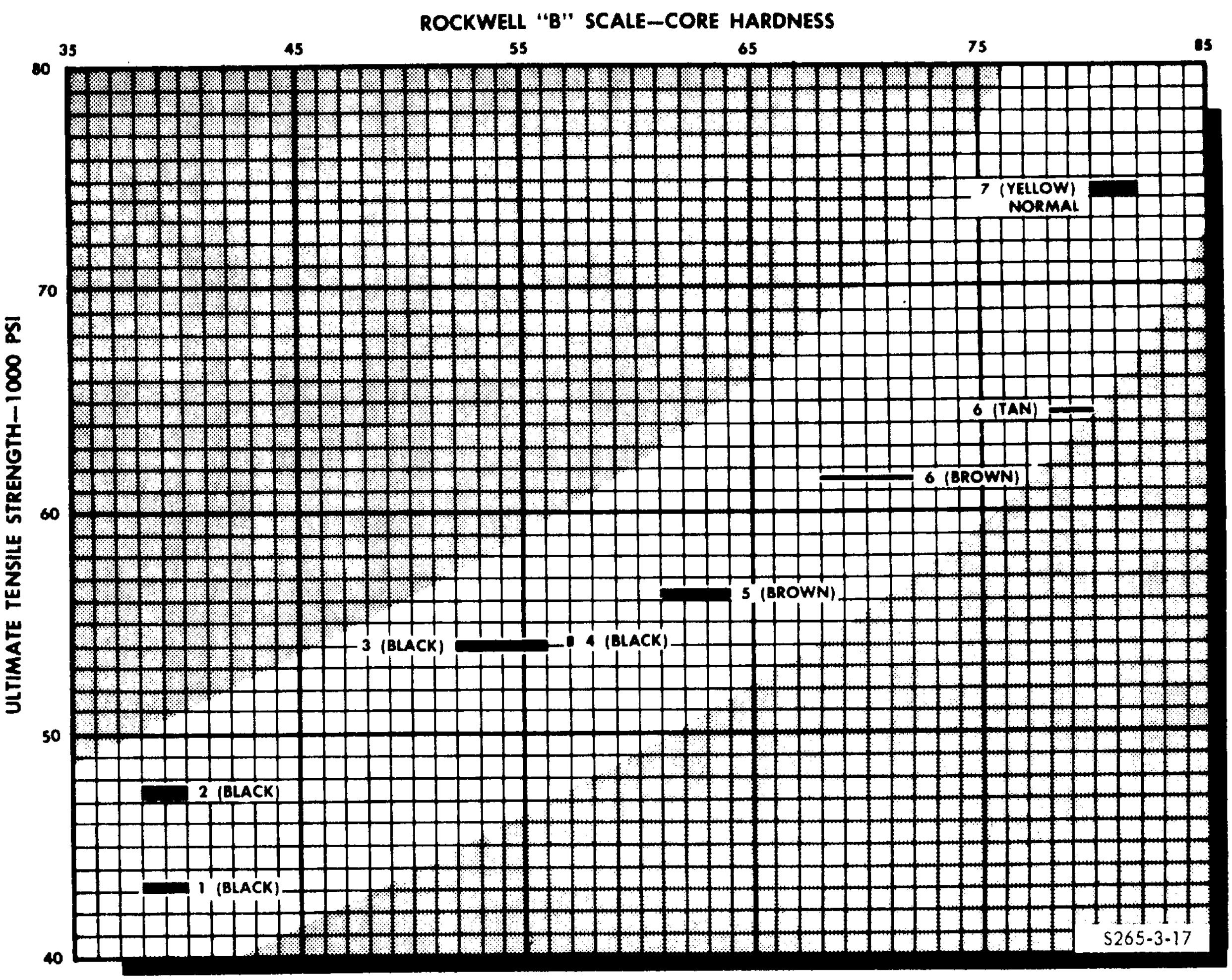
HARDNESS-TESTING AND TENSION-TESTING (Cont'd)

If a decision is made to retain in use a section of 2024-T4 that has undergone slight mechanical change due to overheating, every effort should be made to protect the metal. Painted areas should be stripped, treated with phosphoric cleaner, chemical-film-treated, and re-painted. Surfaces not normally painted should be treated with phosphoric cleaner.

Table 1. Color Hardness-Strength Correlations of 7075-T6 Aluminum Alloy

SAMPLES FROM ONE FIRE-DAMAGED AIRPLANE

	ROCKWELL HARDNESS	PRIMER COLOR	ULTIMATE TENSILE STRENGTH	YIELD STRENGTH	ELONGATION PERCENT IN 2 INCHES
1	B38-40	BLACK	43,000 43,400	23,100 17,950	11 12
2	B38-40	BLACK	47,700 47,100	24,000 24,600	11 12
3	B52-56	BLACK	53,800 54,200	27,500 27,100	16.5 16
4	B-57	BLACK	54,000 54,300	27,500 28,600	14.5 15
5	B61-64	BROWN	56,100 56,500	41,700 43,300	6.5 7.5
6	B78-80 B68-72	TAN BROWN	64,500 61,600	51,600 47,700	6 6
7	B80-82	YELLOW (NORMAL)	74,800 74,100	63,400 65,400	13.5 12
Minimum values for 7075–T6 Federal Spec QQ–A–250/13			72,000	62,000	8



AIRPLANE ALIGNMENT INSPECTION

STRUCTURAL IDENTIFICATION

GENERAL

The airplane alignment data contained in figures 1 thru 4 are used in identifying deformed structure after a hard landing or over-G maneuver. The alignment data should not be considered a criterion for determining structural integrity. In some instances, field checks indicate that an airplane is out of established tolerances. Experience shows that the airplane may be aerodynamically acceptable because flying qualities, performance, and handling characteristics meet established criteria.

Perform a thorough and searching inspection of the airframe. Give particular attention to fittings where heavy weight masses are carried. Remove and examine sampling of fasteners for evidence of shear and tension deformation. Buckling of stressed skins, which did not exist before the hard landing or high-G maneuver, is cause for careful inspection of the substructure and of the pressurized skins for crack propagation. Skin buckling in itself is not necessarily detrimental structurally if the buckles do not cross a row of rivets and have not loosened any rivets. Make a check flight when adequate inspection reveals the structure to be sound and functional checks of the controls and landing gear (after hard landings) are normal.

The airplane is acceptable for flight status if the results of the structural inspection and flight test are satisfactory. Make a complete alignment check if flight tests indicate the airplane is either laterally or directionally out of tolerances and cannot be corrected by rerigging within the tolerances given in the applicable maintenance manual. Forward results of the alignment check and the flight test to Sabreliner Corporation for engineering evaluation.

SURFACE ALIGNMENT INSPECTION

Geometry Check

The geometry check can be made with the airplane resting on the ground (see figures 1 and 4 as applicable). Set horizontal stabilizer at -4° 30′ incidence before measurements are taken. Make all measurements with a steel tape from the points illustrated. If all measurements are within the tolerances given on the illustration, the airplane can be considered symmetrical.

Elevation Check

Drain all fuel to satisfactorily perform an elevation check. Refer to the applicable maintenance manual for defueling instructions. Use an engineer's level or transit to ensure that correct readings are obtained. Preliminary leveling with a spirit level may precede the actual leveling of the airplane with a transit to place the airplane in a level position.

CAUTION

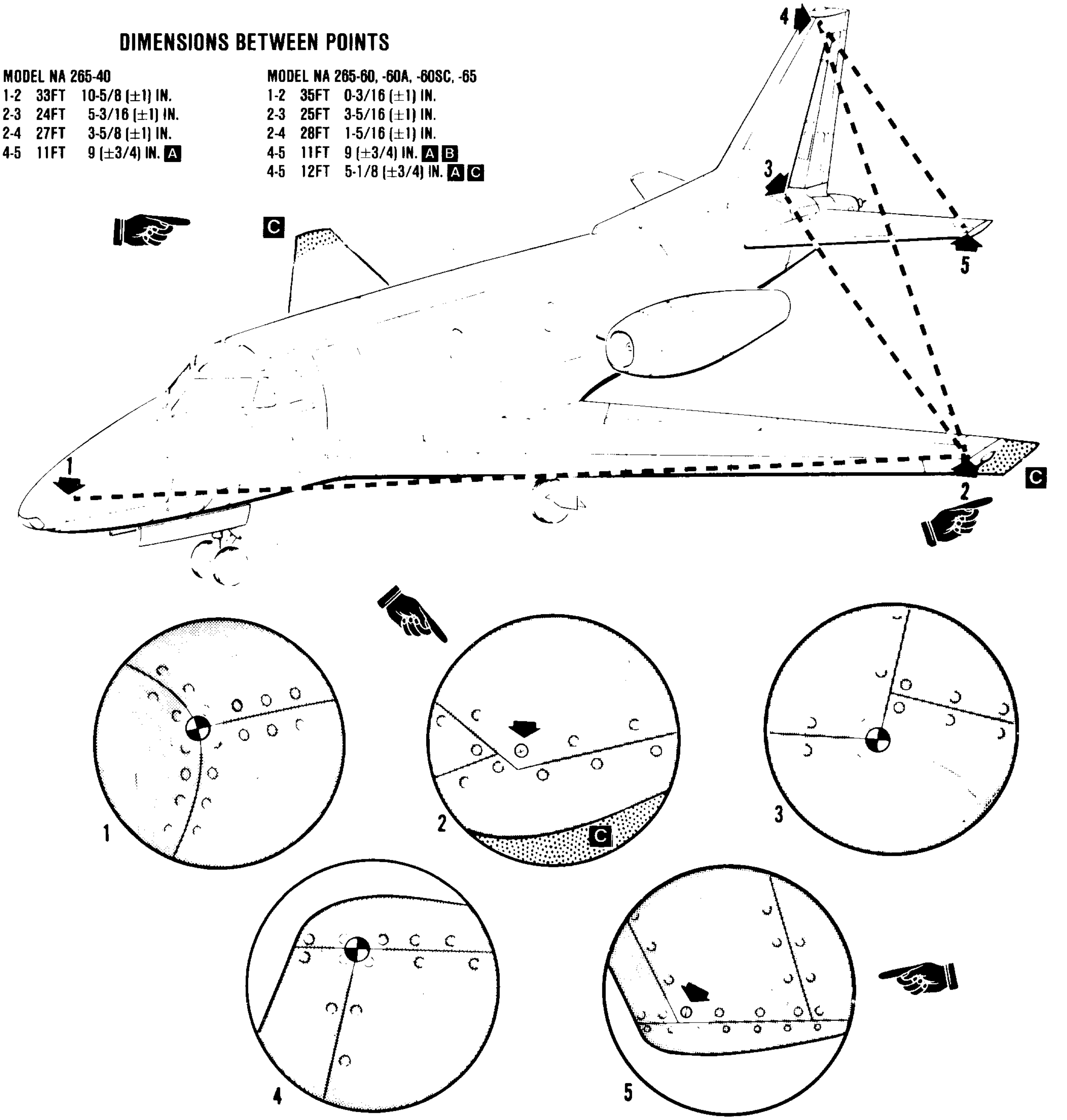
Personnel must not be permitted on or in the airplane while it is upon jacks and the alignment check is in progress.

To level airplane with a spirit level, support airplane, using the two wing jack points and the fwd fuselage jack point. (Refer to the applicable maintenance manual for jacking and leveling instructions.) Adjust jacks until airplane is level laterally as indicated by a spirit level resting on lateral leveling lugs located one on each landing gear trunnion beam on each side of nose wheel well. Longitudinal leveling is done by using a spirit level resting on the longitudinal leveling lugs on the left side of the nose wheel well. Recheck lateral leveling after leveling longitudinally.

To level airplane using an engineer's level (dumpy style) or transit, support airplane on jacks, using the two wing jack points and the fwd fuselage jack point. Position transit in a level position, aft and to either left or right side of the airplane. The position must be such that a scale dropped from all alignment points will be visible. To laterally level airplane, drop scales from points 2L and 2R on underside of wing. (See figures 1 and 2 for Model NA 265-40, -60, -60A, -60SC, and -65, and figures 3 and 4 for Model NA 265-70, -80, -80A, and -80SC. Adjust jacks until readings on both scales are identical. To longitudinally level airplane, drop scales from point 1 and point 5 on the fuselage. Adjust nose jack until readings on scales show point 5 to be 20-5/8 in. higher than point 1. Recheck lateral leveling after leveling longitudinally. Without disturbing setting of transit or engineer's level, take vertical dimension readings from remainder of elevation check points. Figures 1 thru 4 give the relative positions of the check points (in respect to the zero point) and permissible deviations.

DIMENSIONS BETWEEN POINTS

MODEL NA 265-40			MODEL NA 265-60, -60A, -60SC, -65		
1-2	33FT	10-5/8 (±1) IN.	1-2	35FT	0-3/16 (±1) IN.
2-3	24FT	5-3/16 (±1) IN.	2-3	25FT	3-5/16 (±1) IN.
2-4	27FT	3-5/8 (±1) IN.	2-4	28FT	1-5/16 (±1) IN.
4-5	11FT	9 (±3/4) IN. A	4-5	11FT	9 (±3/4) IN. A B
			4-5	12FT	5-1/8 (±3/4) IN. A C



NOTES

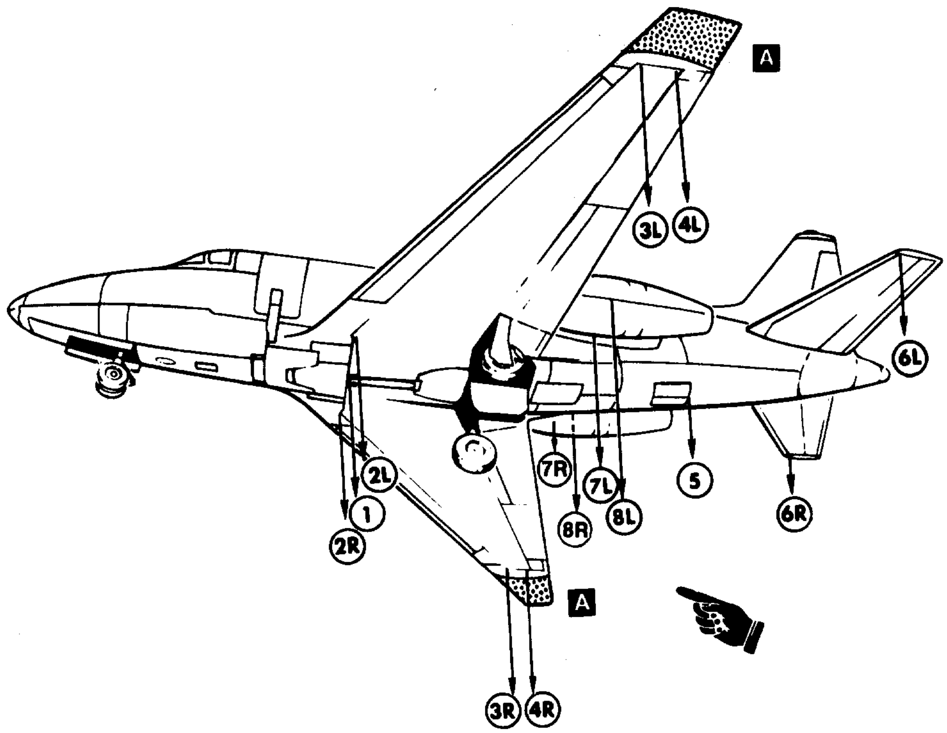
- *Dimensions are typical for both sides. Steel tape should be taut, and measurements should be taken in the same manner on each side.*
- *The airplane need not be leveled to take these dimensions.*

A *With horizontal stabilizer set at -4.5°.*

B *Model NA 265-60.*

C *Extended wing tips, (shaded area), Model NA 265-60A, -60SC, -65.*

Airplane Geometry Check Diagram Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1



THE DIMENSIONS ARE FOR AN AIRPLANE WITH EMPTY FUSELAGE AND WING FUEL CELLS.

LEVEL AIRPLANE LATERALLY AND LONGITUDINALLY, USING POINTS (2L) AND (2R) FOR LATERAL LEVELING AND POINTS (1) AND (5) FOR LONGITUDINAL LEVELING.
POINT (1) IS THE ZERO DIMENSION. DIMENSIONS GIVEN FOR THE OTHER POINTS ARE ADDED TO THE DIMENSION AT POINT (1).
SET HORIZONTAL STABILIZER AT -4-1/2 BEFORE CHECKING DIMENSIONS (6L) AND (6R).

DIMENSIONS BETWEEN POINTS

Points	Dimension
(1)	ZERO DIMENSION
(2L) AND (2R)	4-7/8 (±1/16) IN.
(3L) AND (3R)	18-13/16 (±1/2) IN.
(4L) AND (4R)	19-5/8 (±1/2) IN.
(5)	20-5/8 IN.
(6L) AND (6R)	61-3/16 (±1/2) IN.
(7L) AND (7R)	36-13/16 (±1/8) IN.
(8L) AND (8R)	40-15/16 (±1/4) IN. B

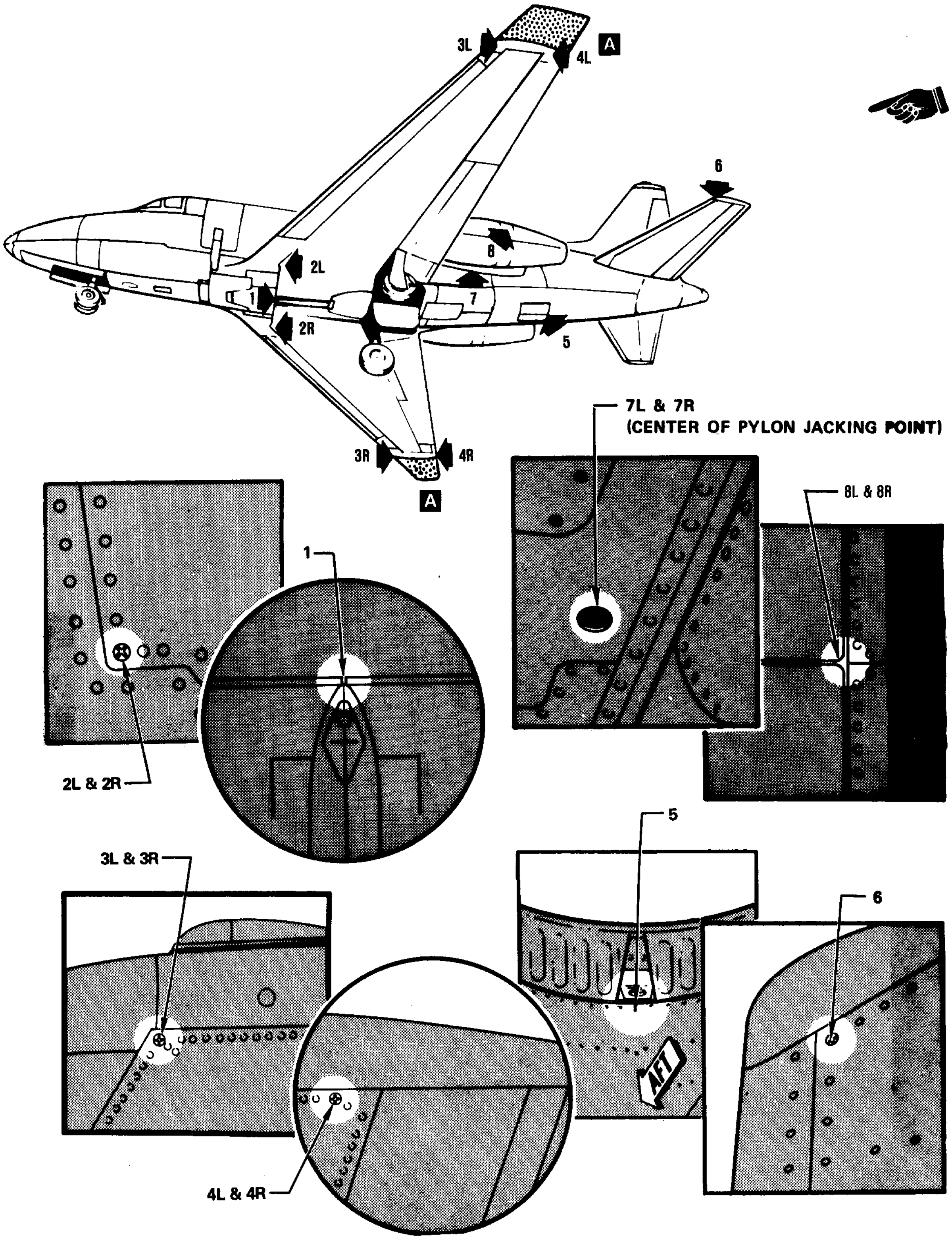
ALLOWABLE DIFFERENCE BETWEEN
(3L) AND (4L) AND (3R) AND (4R) =1/4 IN.
ALLOWABLE DIFFERENCE BETWEEN
(6L) AND (6R) =1/2 IN.

NOTES

A EXTENDED WING TIPS, MODEL NA 265-60A, -60SC, AND -65.

B DOES NOT APPLY TO MODEL NA 265-65.

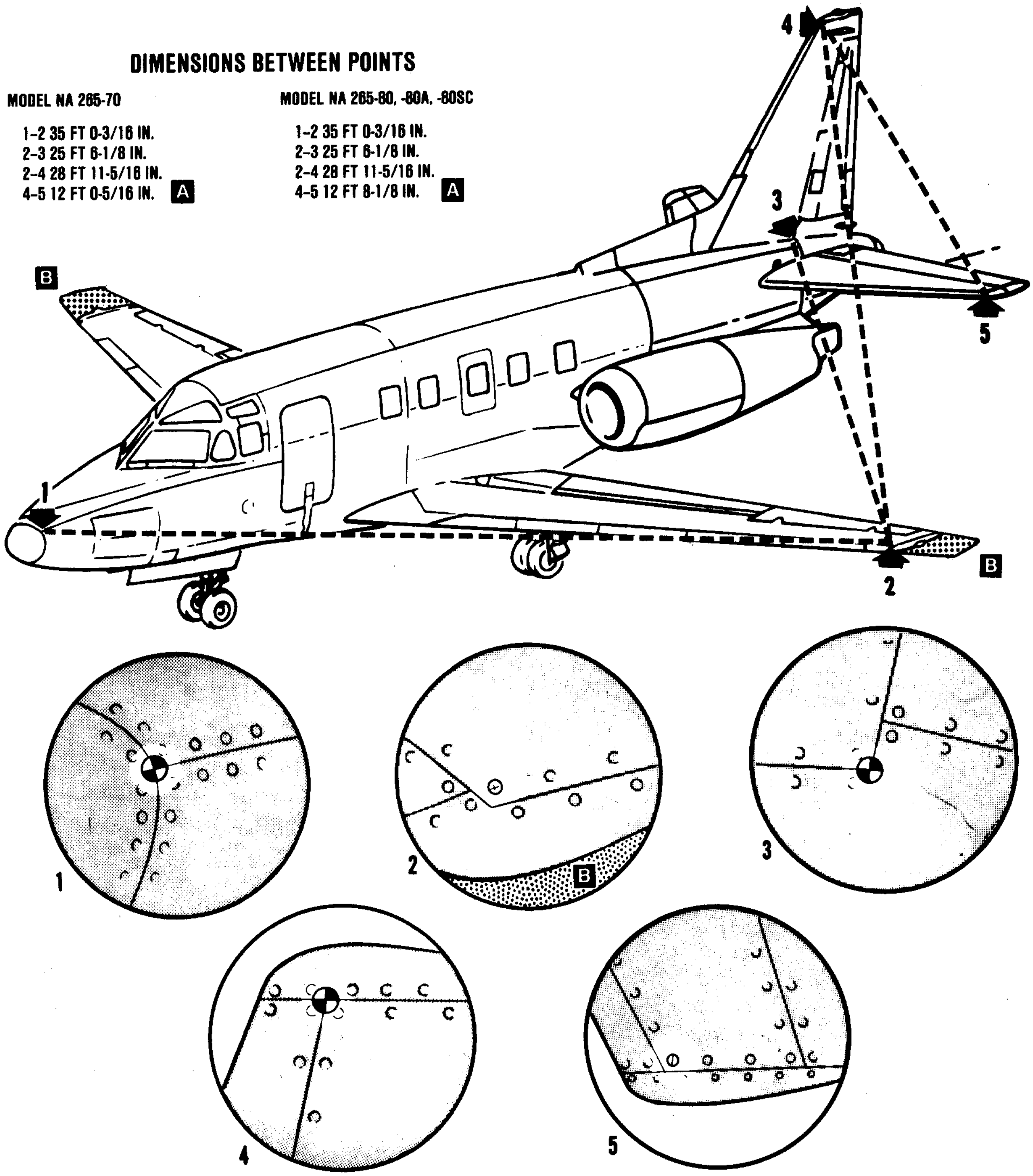
Figure 2 — Airplane Elevation Check Diagram
Model NA 265-40, -60, -60A, -60SC, -65 (Sheet 1 of 2)



NOTE

A *Extended wing tips, Model NA 265-60A, -60SC and -65.*

Elevation Check Diagram Model NA 265-40, -60, -60A, -60SC, -65
Figure 2 (Sheet 2 of 2)



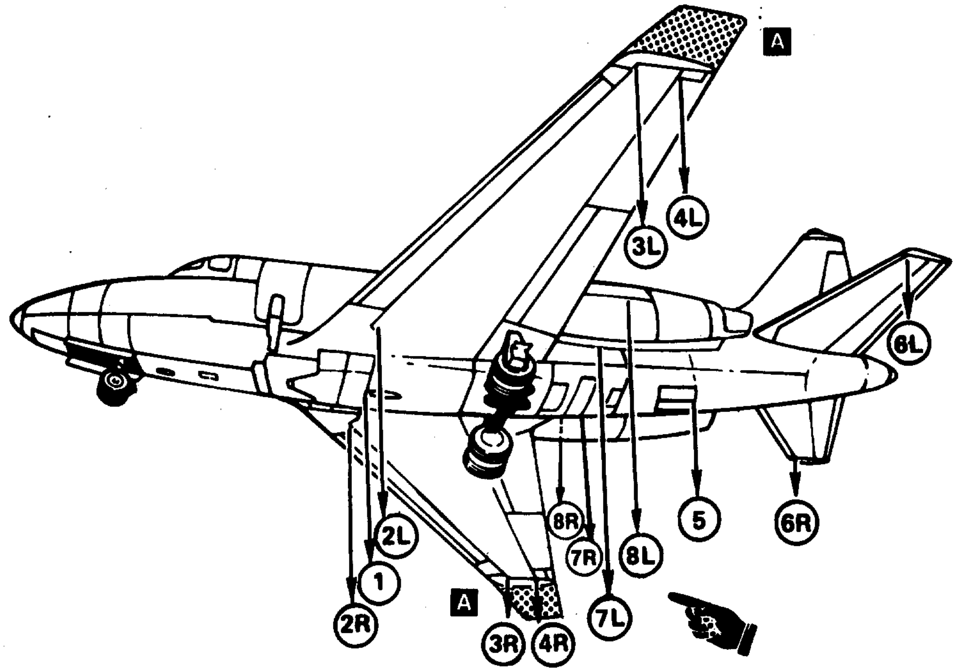
NOTES

- DIMENSIONS ARE TYPICAL FOR BOTH SIDES. STEEL TAPE SHOULD BE TAUT, AND MEASUREMENTS SHOULD BE TAKEN IN THE SAME MANNER ON EACH SIDE.
- THE AIRPLANE NEED NOT BE LEVELED TO TAKE THESE DIMENSIONS.

A WITH HORIZONTAL STABILIZER SET AT -4.5°.

B EXTENDED WINGTIPS, MODEL NA 265-80A and -80SC.

Airplane Geometry Check Diagram
Model NA 265-70, -80, -80A, and -80SC
Figure 3



THE DIMENSIONS ARE FOR AN AIRPLANE WITH EMPTY FUSELAGE AND WING FUEL CELLS.

LEVEL AIRPLANE LATERALLY AND LONGITUDINALLY. USING POINTS (2L) AND (2R) FOR LATERAL LEVELING AND POINTS (1) AND (5) FOR LONGITUDINAL LEVELING.
POINT (1) IS THE ZERO DIMENSION. DIMENSIONS GIVEN FOR THE OTHER POINTS ARE ADDED TO THE DIMENSION AT POINT (1).
SET HORIZONTAL STABILIZER AT -4-1/2 BEFORE CHECKING DIMENSIONS (6L) AND (6R).

DIMENSIONS BETWEEN POINTS

Points	Dimension
(1)	ZERO DIMENSION
(2L) AND (2R)	4-7/8 IN.
(3L) AND (3R)	18-13/16 IN.
(4L) AND (4R)	19-5/8 IN.
(5)	20-5/8 IN.
(6L) AND (6R)	-70, 70-3/16 IN.; -80, 70-9/16 IN.
(7L) AND (7R)	-70, 36-13/16 IN.; -80, 39-1/8 IN.
(8L) AND (8R)	-70,-40-15/16 IN.; -80, 42-1/16 IN.

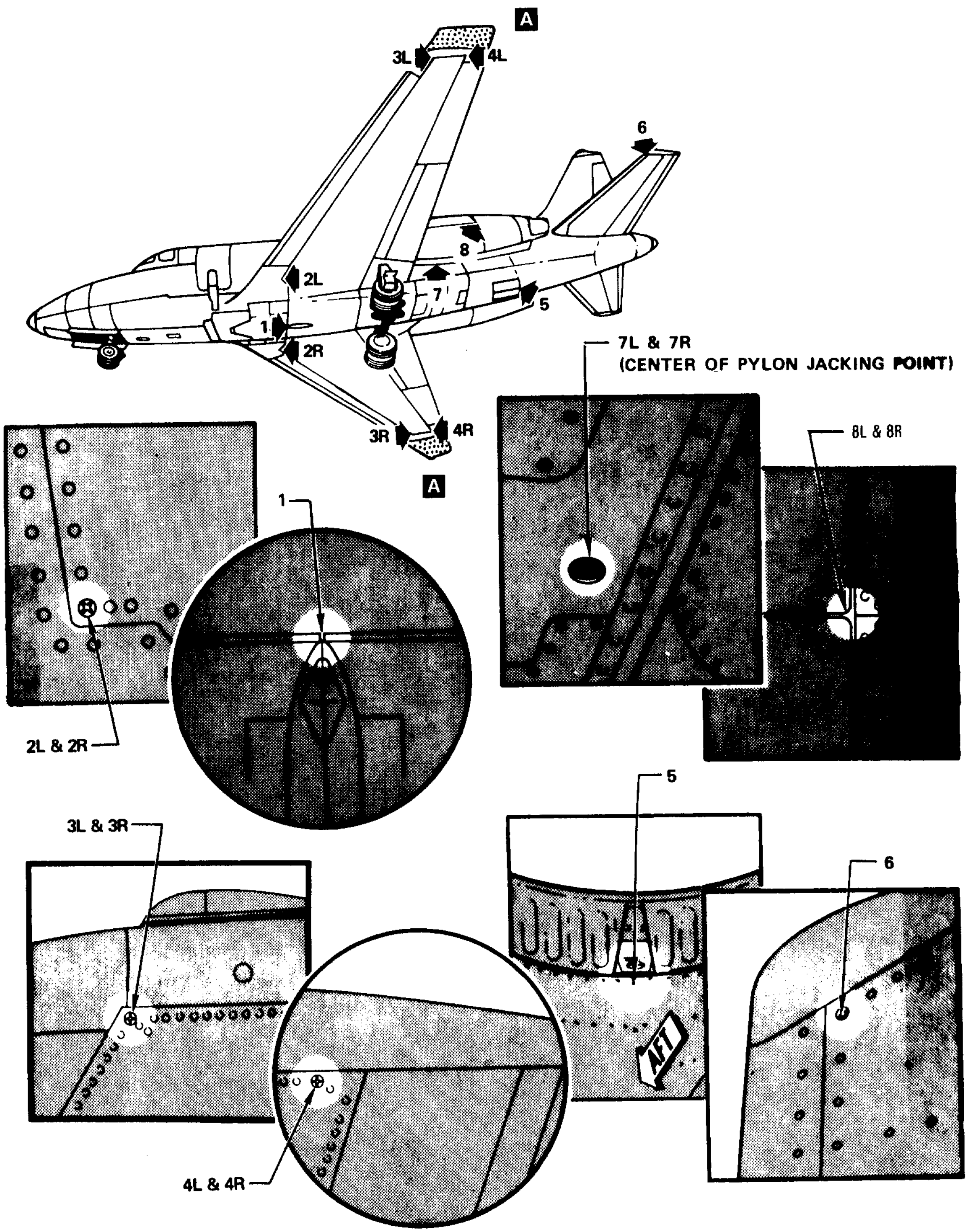
ALLOWABLE DIFFERENCE BETWEEN
(3L) AND (4L) AND (3R) AND (4R) 1/4 IN.
ALLOWABLE DIFFERENCE BETWEEN
(6L) AND (6R) 1/2 IN.

NOTE

A EXTENDED WING TIPS, MODEL NA 265-80A AND -80SC.

Figure 4 — Airplane Elevation Check Diagram
Model NA 265-70, -80, -80A, and -80SC (Sheet 1 of 2)

ELEVATION CHECK POINTS



NOTE

A EXTENDED WINGTIPS, MODEL NA 265-80A AND -80SC.

Elevation Check Point Diagram
Model NA 265-70, -80, -80A, and -80SC
Figure 4 (Sheet 2 of 2)

STRUCTURAL JOINT WEAR

STRUCTURAL IDENTIFICATION

GENERAL

The maximum wear allowance of a joint as given in tables 1 thru 7 is the total clearance between the shaft and hole. All wear may be in one part or divided between the two, except that bolt wear must not exceed 3% of bolt diameter for bolts less than or equal to 1/4 in. diameter. Bolts over 1/4 in. must not be worn more than 0.004 in. When the wear allowance has not been exceeded, the part may be retained in service. When the wear allowance has been exceeded, the part must be bushed (when permissible) or replaced. For bushing and rebushing data, refer to Wear and Bushing (Rebushing) of Structural Joints.

ALLOWABLE WEAR AND REBUSHING DATA (AW & RD)

Wing-to-Fuselage Fittings

See figure 1 and table 1.

Slat and Slat Track Fittings

See figure 2 and table 2.

Aileron Fittings

See figure 3 and table 3.

Flap Fittings

See figure 4 and table 4.

Elevator Attachment Fittings

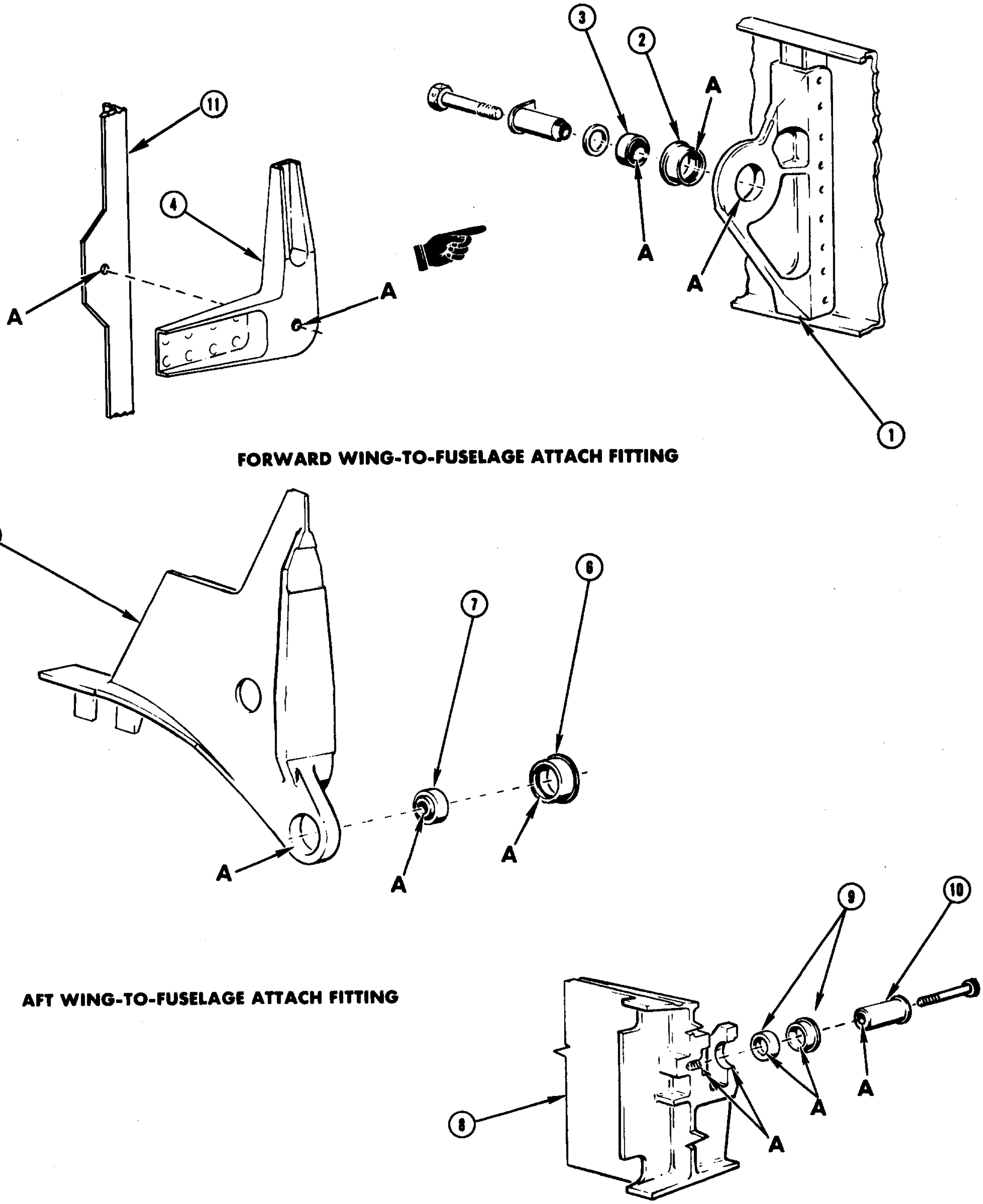
See figure 5 and table 5.

Horizontal Stabilizer Attachment Fittings

See figure 6 and table 6.

Vertical Stabilizer/Rudder Fittings

See figure 7 and table 7.



AW & RD — Wing-to-Fuselage Fittings
Figure 1

Table 1. AW & RD — Wing-to-Fuselage Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION	HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	SUPPORT 265-130924	A	RETAINER 265-130923	1.3130	1.3120	0.0010	0.0020
	OR 265-130938						
2	RETAINER 265-130923	A	BEARING HSBG-10	1.1875	1.1870	0.0005	0.0010
3	BEARING HSBG-10, KNDB10-22 OR 176442	A	BOLT 265-100038	0.6250	0.6215	0.0035	0.0055
			OR 265-100042				
4	FITTING 265-311209	A	BOLT 265-100038	0.6255	0.6215	0.0040	0.0060
5	FITTING 265-312262	A	BUSHING 265-312261	1.5630	1.5619	0.0011	0.0016
6	BUSHING 265-312261	A	BEARING HSBG-12SA	1.4383	1.4370	0.0013	0.0020
7	BEARING HSBG-12SA	A	BOLT 265-100039	0.7500	0.7425	0.0075	0.0090
8	INBOARD REAR SPAR 265-130017	A	BUSHING 265-130751	0.9380	0.9380	0.0000	0.0000
			AND 265-130752				
9	BUSHING 265-130751	A	BOLT 265-100039	0.7505	0.7425	0.0080	0.0100
	AND 265-130752						
10	BOLT 265-100039	A	BOLT NAS624H36	0.2760	0.2485	0.0275	0.0350
11	CAP ANGLE **A** 265-312205	A	BOLT 265-100038	0.6255	0.6215	0.0040	0.0060

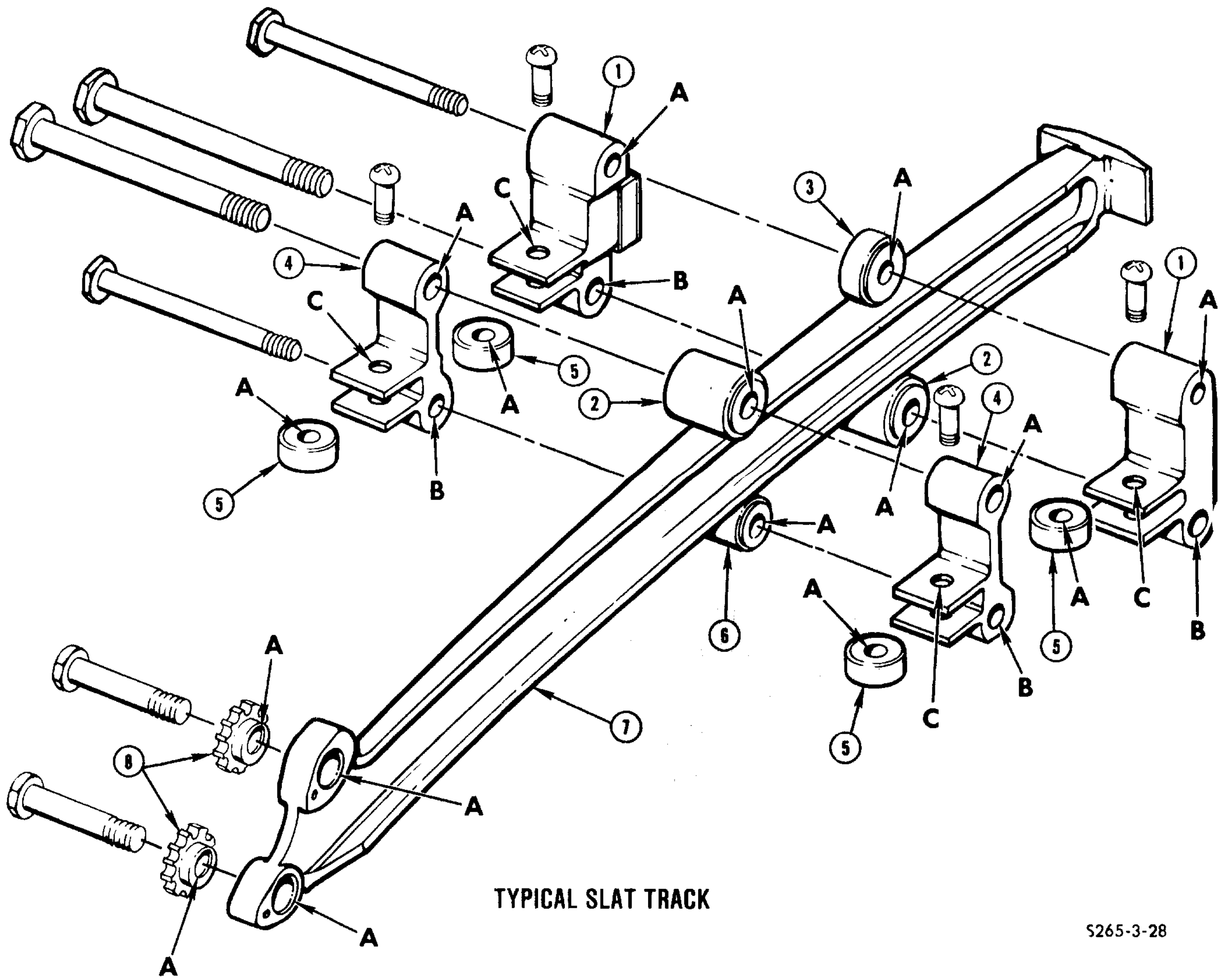
REBUSHING DATA

ITEM NO.	DESCRIPTION	HOLE	REAM DIA (MAX)	BUSHING			
				MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	SUPPORT 265-130924	A		REPLACE WORN PART.			
2	RETAINER 265-130923	A		REPLACE WORN PART.			
3	BEARING HSBG-10	A		REPLACE WORN PART.			
4	FITTING **A** 265-311209	A	0.751	4130 STEEL BAR	160-180,000	0.6245	0.6255
5	FITTING 265-312262	A		REPLACE WORN PART.			
6	BUSHING 265-312261	A		REPLACE WORN PART.			
7	BEARING HSBG-12SA	A		REPLACE WORN PART.			
8	SPAR 265-130017	A	1.0015	—	—	—	—
9	BUSHING 265-130751						
	AND 265-130752	A	—	4130 STEEL BAR	140,000 TO 160,000	0.7495	0.7505
10	BOLT 265-100039	A		REPLACE WORN PART.			
11	CAP ANGLE **A** 265-312205	A	0.751	4130 STEEL BAR	160-180,000	0.6245	0.6255

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" AND SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION FOR ADDITIONAL INSTRUCTIONS.

A BUSHINGS TO BE INSTALLED WITH 0.001 IN. CLEARANCE FIT; USE LOCTILE RETAINING COMPOUND 35, MIL-R-46082A (MR), TYPE III, AND LOCQUIK PRIMER "N", OR EQUIVALENT.



AW & RD — Slat and Slat Track Fittings
Figure 2

Table 2. AW & RD — Slat and Slat Track Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION		HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	AFT SUPPORT	265-130918	A	BOLT NAS1304-43H	0.2505	0.2485	0.0020	0.0030
			B	BOLT NAS1305-43H	0.3130	0.3110	0.0020	0.0030
			C	SCREW NAS221-15	0.1920	0.1900	0.0020	0.0050
2	BEARING	YR137CP-X	A	BOLT NAS1305-43H	0.3128	0.3110	0.0018	0.0028
3	BEARING	4NBF614-YJ	A	BOLT NAS1304-43H	0.2500	0.2485	0.0015	0.0025
4	FORWARD SUPPORT	265-130917	A	BOLT NAS1305-43H	0.3130	0.3110	0.0020	0.0030
			B	BOLT NAS1304-43H	0.2505	0.2485	0.0020	0.0030
			C	SCREW NAS221-15	0.1920	0.1900	0.0020	0.0050
5	BEARING	3NBF512-YJ	A	SCREW NAS221-15	0.1900	0.1900	0.0000	0.0010
6	BEARING	YR213	A	BOLT NAS-1304-43H	0.2500	0.2485	0.0015	0.0025
7	SLAT TRACKS	265-170006	A	BUSHING 246-17065	0.4380	0.4337	0.0043	0.0070
		265-170007	↑	↑	↑	↑	↑	↑
		265-170008	↕	↕	↕	↕	↕	↕
		265-170009	↓	↓	↓	↓	↓	↓
		265-170010	A	BUSHING 246-17065	0.4380	0.4337	0.0043	0.0070
8	BUSHING	246-17065	A	BOLT NAS1104-12	0.2505	0.2485	0.0020	0.0040

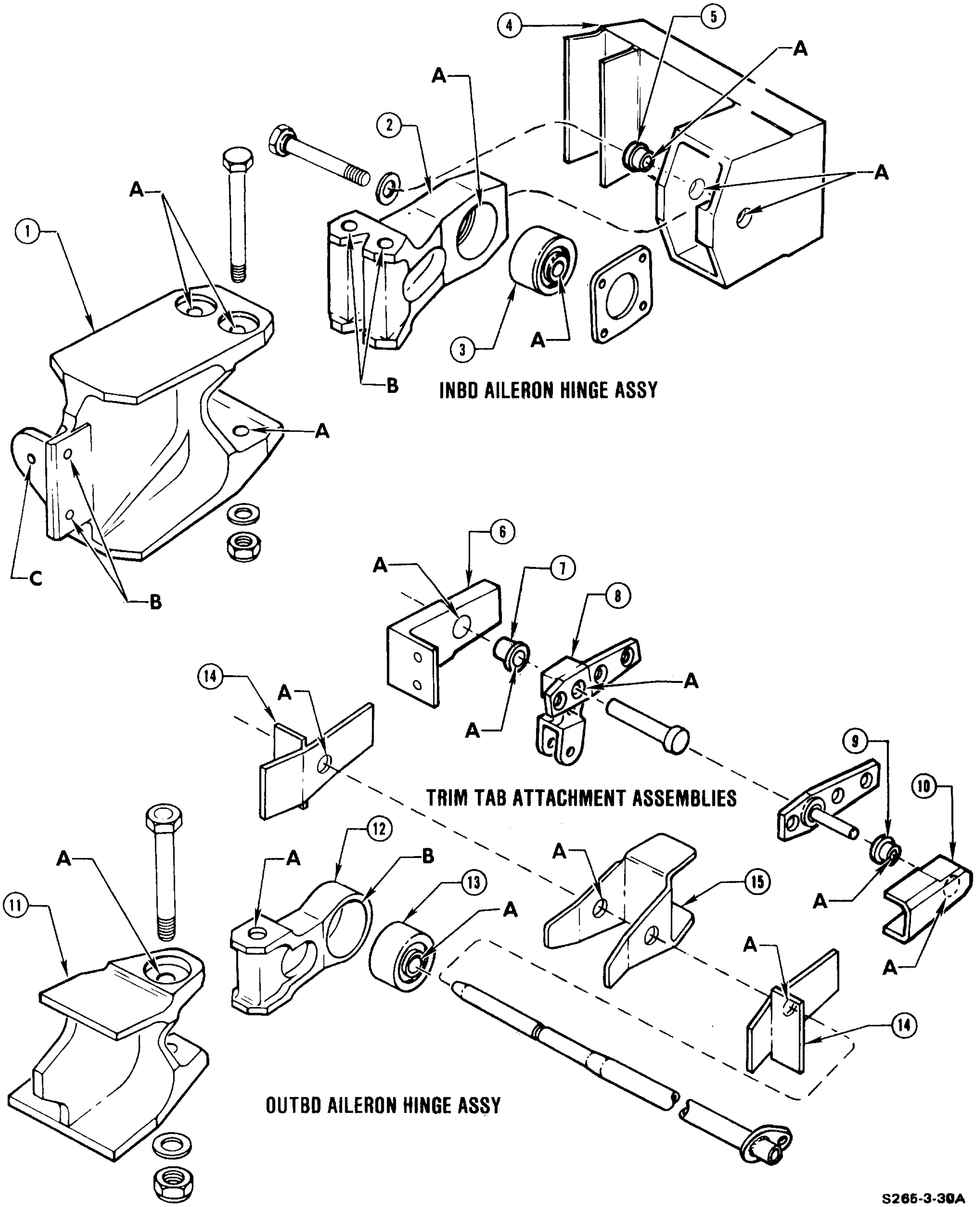
REBUSHING DATA

ITEM NO.	DESCRIPTION		HOLE	REAM DIA (MAX)	BUSHING			
					MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	AFT SUPPORT	265-130918	A	0.3750	B	B	0.2495	0.2505
			B	0.3765	A	A	0.3120	0.3130
			C	0.3140	B		0.1880	0.1920
2	BEARING	YR137CP-X	A		REPLACE WORN PART.			
3	BEARING	4NBF614-YJ	A		REPLACE WORN PART.			
4	FORWARD SUPPORT	265-130917	A	0.3765	A	A	0.3120	0.3130
			B	0.3750	B	B	0.2495	0.2505
			C	0.3140	B	B	0.1880	0.1920
5	BEARING	3NBF512-YJ	A		REPLACE WORN PART.			
6	BEARING	YR213	A		REPLACE WORN PART.			
7	SLAT TRACKS	265-170006	A		REPLACE WORN PART.			
		265-170007	↑		↑			
		265-170008	↕		↕			
		265-170009	↓		↓			
		265-170010	A		REPLACE WORN PART.			
8	BUSHING	246-17065	A		REPLACE WORN PART.			

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INSTRUCTIONS.

A USE 4B26 (SALVAGE) BUSHING.
B USE 4B19 BUSHING.
} SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION.



AW & RD — Aileron Fittings
Figure 3

Table 3. AW & RD — Aileron Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION	HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	INBOARD SUPPORT 265-160050	A	BOLT NAS1105-42W	0.3130	0.3110	0.0020	0.0040
		B	BOLT NAS1104-4W	0.2540	0.2485	0.0055	0.0090
		C	BOLT NAS1104	0.2540	0.2485	0.0055	0.0090
2	LINK 246-16530	A	BEARING DSRP5	1.2501	1.2495	0.0006	0.0012
		B	BOLT NAS1105-42W	0.3130	0.3110	0.0020	0.0040
3	BEARING DSRP5	A	BOLT AN175H-17A	0.3125	0.3112	0.0013	0.0023
4	SUPPORT 265-160071	A	BUSHING 4820M-S5-005	0.4380	0.4385	−0.0005	−0.0005
5	BUSHING 4B20M-S5-005	A	BOLT AN175H-17A	0.3130	0.3112	0.0018	0.0030
6	INBOARD FITTING 265-160070	A	BUSHING 4B20M-S4-006	0.3755	0.3760	−0.0005	−0.0005
7	BUSHING 4B20M-S4-006	A	PIN 265-160038	0.2505	0.2470	0.0035	0.0040
8	HORN ASSY 265-160038	A	PIN 265-160038	0.2480	0.2470	0.0010	0.0015
9	BUSHING 4B20M-S4-004	A	PIN 246-16056	0.2505	0.2470	0.0035	0.0040
10	FITTING 246-16054	A	BUSHING 4B20M-S4-004	0.3755	0.3760	−0.0005	−0.0005
11	OUTBOARD SUPPORT 265-160051	A	BOLT NAS1106-29	0.3755	0.3735	0.0020	0.0040
12	LINK 246-16531	A	BOLT NAS1106-29	0.3755	0.3735	0.0020	0.0040
		B	BEARING DSRP5	1.2501	1.2495	0.0006	0.0012
13	BEARING DSRP5	A	PIN 246-16548-11	0.3125	0.3106	0.0019	0.0029
			PIN 265-160074	0.3125	0.3112	0.0013	0.0023
14	SUPPORT 265-160066-5	A	PIN 265-160074	0.3130	0.3112	0.0018	0.0028
15	INTERCOSTAL 265-160060-2	A	PIN 265-160074	0.3130	0.3112	0.0018	0.0028

REBUSHING DATA

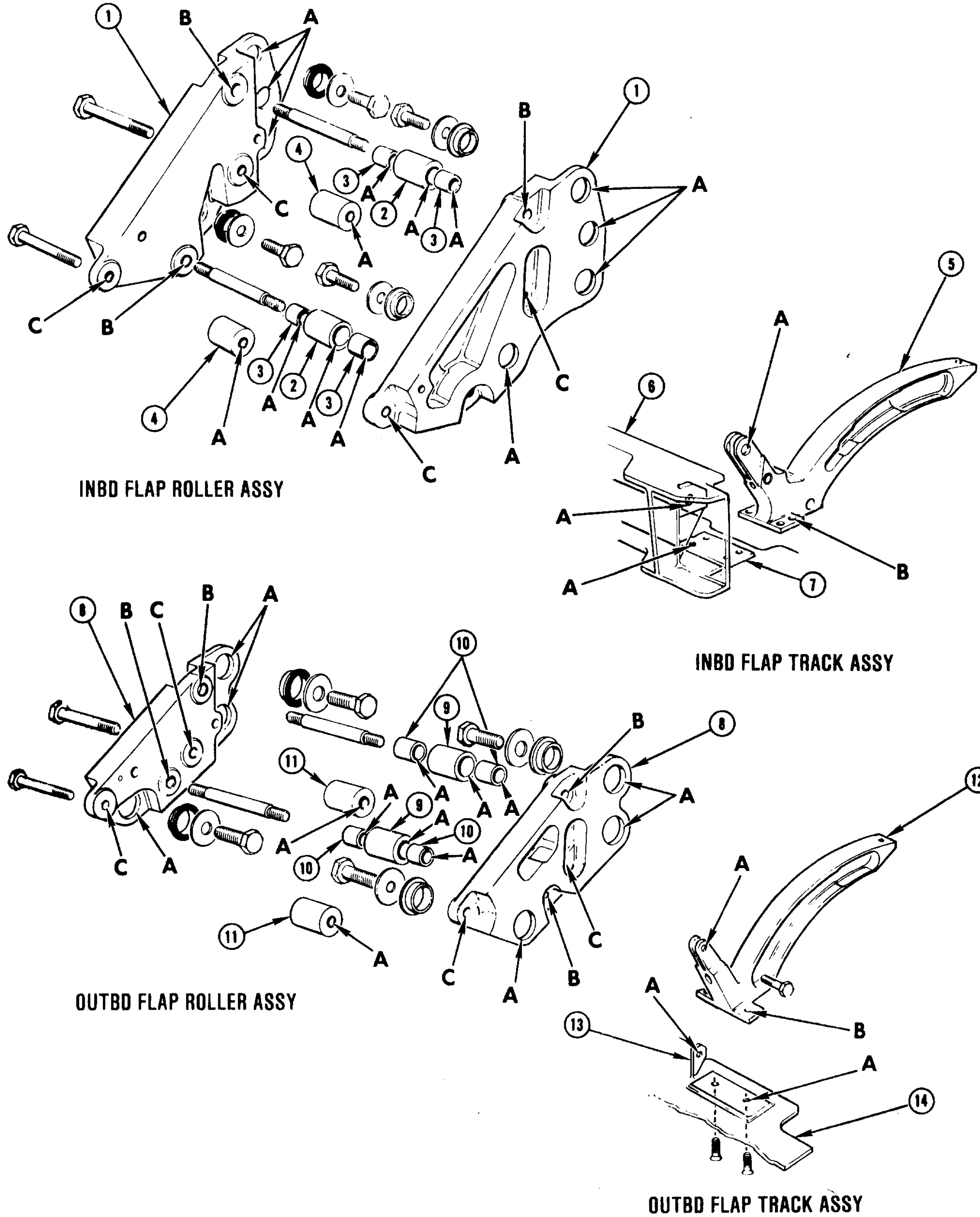
ITEM NO.	DESCRIPTION	HOLE	REAM DIA (MAX)	BUSHING MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	INBOARD SUPPORT 265-160050	A	0.3250	B	B	0.3120	0.3130
		B		USE NEXT LARGER SIZE FASTENER.			
		C	0.3750	B	B	0.2490	0.2540
2	LINK 246-16530	A		REPLACE WORN PART.			
		B	0.3250	B	B	0.3130	0.3120
3	BEARING DSRP5	A		REPLACE WORN PART.			
4	SUPPORT 265-160071	A		REPLACE WORN PART.			
5	BUSHING 4B20M-S5-005	A		REPLACE WORN PART.			
6	FITTING 265-160070	A	0.5000				
7	BUSHING 4B20M-S4-006	A		4130 STEEL BAR	125,000 TO 145,000	0.2495	0.2505
8	HORN ASSY 265-160038	A	0.3110	A	A	0.2470	0.2480
9	BUSHING 4B20M-S4-004	A		4130 STEEL BAR	125,000 TO 145,000	0.2495	0.2505
10	FITTING 256-16054	A	0.5000				
11	OUTBOARD SUPPORT 265-160051	A	0.5000	B	B	0.3745	0.3755
12	LINK 246-16531	A	0.4390	A	A	0.3745	0.3755
		B		REPLACE WORN PART.			
13	BEARING DSRP5	A		REPLACE WORN PART.			
14	SUPPORT 265-160066-5	A		C			
15	INTERCOSTAL 265-160060-2	A		C			

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INSTRUCTIONS.

A USE 4B26 (SALVAGE) BUSHING.
B USE 4B19 BUSHING.
} REFER TO "BUSHING AILERON OUTBD HINGE FITTING."

C SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION.



AW & RD — Flap Fittings
Figure 4

Table 4. AW & RD — Flap Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION	HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	PLATE 265-180077	A	BUSHING 246-18045	0.6880	0.6890	−0.0010	−0.0010
		B	STUD 265-180079	0.3745	0.3725	0.0020	0.0030
		C	BOLT NAS1105-23D	0.3130	0.3110	0.0020	0.0030
2	ROLLER 265-180078	A	BUSHING 4B19B-6-.015	0.5005	0.5010	−0.0005	−0.0005
3	BUSHING 4B19B-6-.015	A	STUD 265-180079	0.3755	0.3725	0.0030	0.0040
4	BEARING YR137CP-X	A	BOLT NAS1105-23D	0.3128	0.3110	0.0018	0.0028
5	FLAP TRACK 265-180050	A	BOLT NAS1108-13W	0.5005	0.4985	0.0020	0.0030
		B	SCREW 7S35-5A6	0.3165	0.3110	0.0055	0.0070
6	INBOARD REAR SPAR 265-130017	A	BOLT NAS1108-13W	0.5005	0.4985	0.0020	0.0030
7	LOWER WING SKIN 265-130102	A	SCREW 7S35-5A6	0.3165	0.3110	0.0055	0.0080
8	PLATE 265-180086	A	BUSHING 246-18045	0.6880	0.6890	−0.0010	−0.0010
		B	STUD 265-180079	0.3745	0.3725	0.0020	0.0030
		C	BOLT NAS1105-28D	0.3130	0.3110	0.0020	0.0030
9	ROLLER 265-180078	A	BUSHING 4B19B-6-.015	0.5005	0.5010	−0.0005	−0.0005
10	BUSHING 4B19B-6-.015	A	STUD 265-180079	0.3755	0.3725	0.0030	0.0040
11	BEARING YR137CP-X	A	BOLT NAS1105-28D	0.3128	0.3110	0.0018	0.0028
12	FLAP TRACK 265-180051	A	BOLT NAS1105-8W	0.3130	0.3110	0.0020	0.0030
		B	SCREW 7S35-5A7	0.3165	0.3110	0.0055	0.0070
13	OUTBOARD REAR SPAR 265-130004	A	BOLT NAS1105-8W	0.3130	0.3110	0.0020	0.0030
14	LOWER WING SKIN 265-130102	A	SCREW 7S35-5A7	0.3165	0.3110	0.0055	0.0080

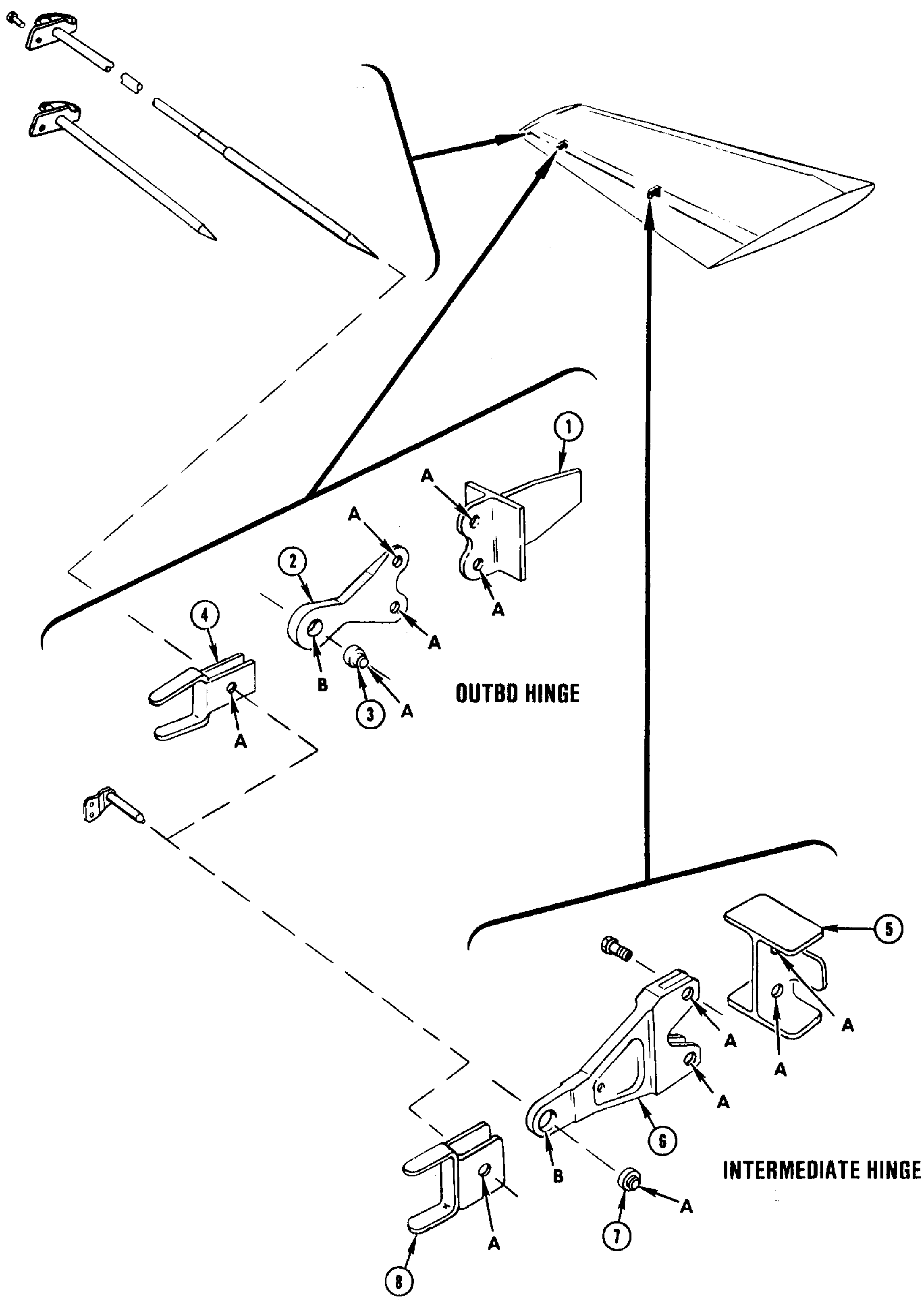
REBUSHING DATA

ITEM NO.	DESCRIPTION	HOLE	REAM DIA (MAX)	BUSHING			
				MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	PLATE 265-180077	A		REPLACE WORN PART.			
		B		REPLACE WORN PART.			
		C	0.4375	B	B	0.3120	0.3165
2	ROLLER 265-180078	A		REPLACE WORN PART.			
3	BUSHING 4B19B-6-.015	A		REPLACE WORN PART.			
4	BEARING YR137CP-X	A		REPLACE WORN PART.			
5	FLAP TRACK 265-180050	A		WEAR NOT ANTICIPATED.			
		B		WEAR NOT ANTICIPATED.			
6	INBOARD REAR SPAR 265-130017	A	0.5640	A	A	0.4990	0.5005
7	LOWER WING SKIN 265-130102	A	0.4375	B	B	0.3115	0.3165
8	PLATE 265-180086	A		REPLACE WORN PART.			
		B		REPLACE WORN PART.			
		C	0.4375	B	B	0.3120	0.3130
9	ROLLER 265-180078	A		REPLACE WORN PART.			
10	BUSHING 4B19B-6-.015	A		REPLACE WORN PART.			
11	BEARING YR137CP-X	A		REPLACE WORN PART.			
12	FLAP TRACK 265-180051	A		WEAR NOT ANTICIPATED.			
		B		WEAR NOT ANTICIPATED.			
13	OUTBOARD REAR SPAR 265-130004	A	0.3765	A	A	0.3115	0.3130
14	WING LOWER SKIN 265-130102	A	0.4375	B	B	0.3115	0.3165

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INSTRUCTIONS."

A USE 4B26 (SALVAGE) BUSHING.
B USE 4B19 BUSHING.
} SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION.



AW & RD — Elevator Attachment Fittings
Figure 5

Table 5. AW & RD — Elevator Attachment Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION	HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	SUPPORT 265-210419	A	BOLT NAS1104-6W	0.2540	0.2485	0.0055	0.0070
2	SUPPORT 265-220429	A	BOLT NAS1104-6W	0.2540	0.2485	0.0055	0.0070
		B	BEARING AN206DSP4	0.9014	0.9009	0.0005	0.0005
3	BEARING AN206DSP4	A	PIN 265-220423-11	0.2500	0.2487	0.0013	0.0013
4	CLIP 265-220316-5	A	PIN 265-220423-11	0.2510	0.2487	0.0023	0.003
5	SUPPORT 265-210418	A	BOLT NAS1106-12W	0.3790	0.3745	0.0045	0.0055
6	SUPPORT 265-220418 OR 285-220418	A	BOLT NAS1106-12W	0.3790	0.3745	0.0045	0.0055
		B	BEARING DSP4	0.9014	0.9009	0.0005	0.0005
7	BEARING DSP4	A	PIN 265-220424	0.2500	0.2487	0.0013	0.0013
8	CLIP 265-220318	A	PIN 265-220424	0.2510	0.2487	0.0023	0.003

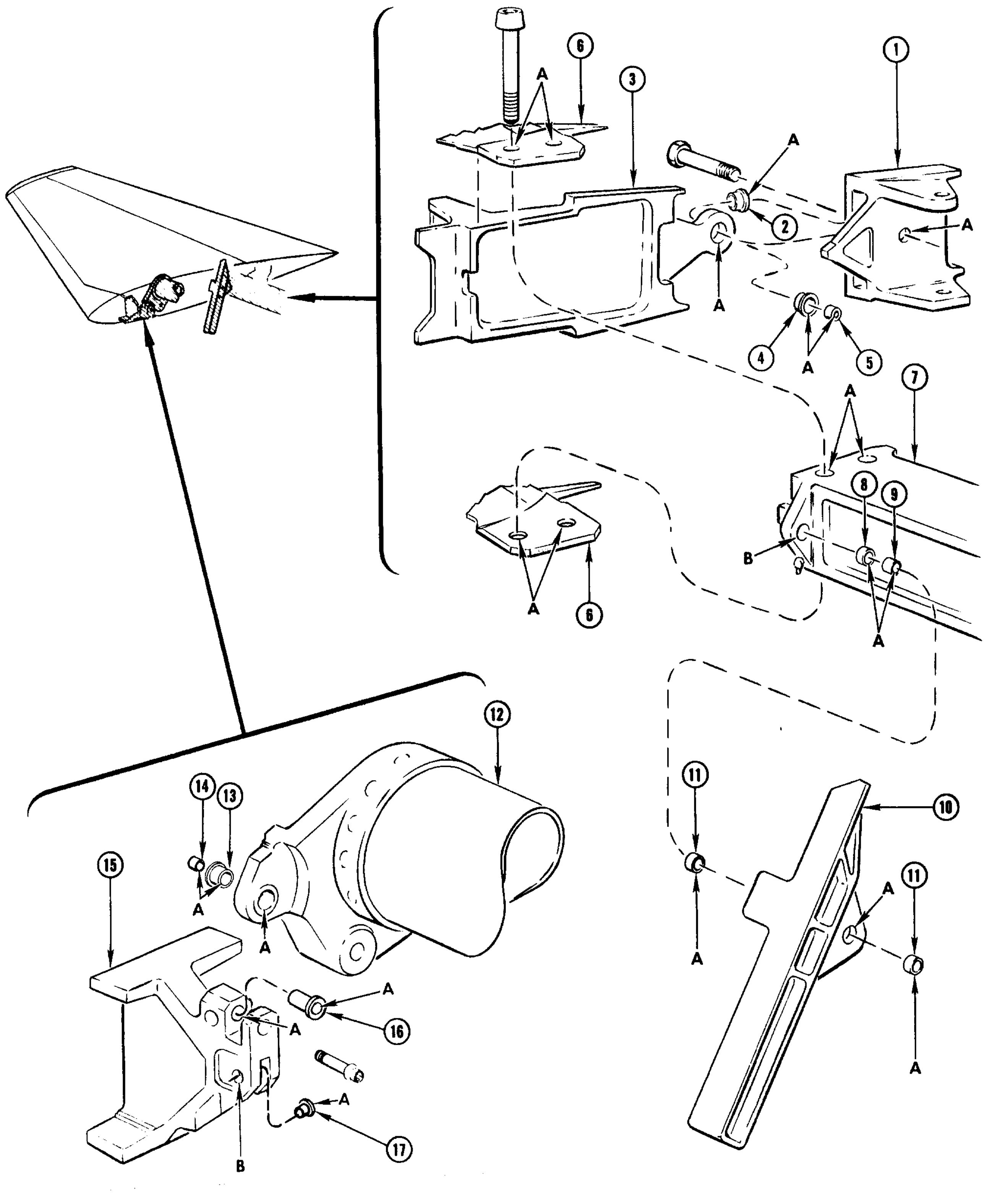
REBUSHING DATA

ITEM NO.	DESCRIPTION	HOLE	REAM DIA (MAX)	BUSHING			
				MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	SUPPORT 265-210419	A	0.2820	A	A	0.2490	0.2540
2	SUPPORT 265-220429	A	0.2820	A	A	0.2490	0.2540
		B		REPLACE WORN PART.			
3	BEARING AN206DSD4	A		REPLACE WORN PART.			
4	CLIP 265-220316-5	A		REPLACE WORN PART.			
5	SUPPORT 265-210418	A	0.4070	A	A	0.3740	0.3790
6	SUPPORT 265-220418	A		REPLACE WORN PART.			
		B		REPLACE WORN PART.			
7	BEARING DSP4	A		REPLACE WORN PART.			
8	CLIP 265-220318	A		REPLACE WORN PART.			

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INSTRUCTIONS.

A USE 4B26 (SALVAGE) BUSHING. (SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION.)



AW & RD — Horizontal Stabilizer Attachment Fittings
Figure 6

Table 6. AW & RD — Horizontal Stabilizer Attachment Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION	HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	SUPPORT 265-220401	A	BUSHING 4B20M-S4-004	0.3755	0.3760	0.0005	0.0005
2	BUSHING 4B20M-S4-004	A	BOLT NAS1104-18W	0.2505	0.2485	0.0020	0.0030
3	SUPPORT 265-210417	A	BUSHING 246-24429	1.0630	1.0640	0.0010	0.0010
4	BUSHING 246-24429	A	BEARING BR-4	0.9014	0.9009	0.0005	0.0005
5	BEARING BR-4	A	BOLT NAS1104-18W	0.2505	0.2485	0.0020	0.0020
6	CAP 265-210402	A	BOLT MS20012-92	0.7505	0.7468	0.0037	0.0037
7	BEAM 265-210412 E	A	BOLT MS20012-92	0.7505	0.7468	0.0037	0.0037
	380-210412 F	B	RETAINER 246-21408-3	1.5630	1.5620	0.0010	0.0010
8	RETAINER 246-21408-3	A	BEARING HSB6-12SA	1.4375	1.4370	0.0005	0.0010
9	BEARING HSB6-12SA	A	BOLT 265-210414	0.7505	0.7480	0.0025	0.0035
10	SUPPORT 265-313459 (LH)	A	BUSHING 265-210413	0.8755	0.8735	0.0020	0.0020
10	SUPPORT 265-313463 (RH)	A	BUSHING 265-313468	0.8755	0.8760	0.0005	0.0005
11	BUSHING 265-210413 (LH)	A	BOLT 265-210414	0.7505	0.7480	0.0025	0.0035
11	BUSHING 4B19-S12-008 (RH)	A	BOLT 265-210414	0.7505	0.7480	0.0025	0.0035
12	FITTING 265-522098	A	RETAINER 265-522100	0.7813	0.7808	0.0005	0.0010
13	RETAINER 265-522100	A	BEARING HU-5S	0.6875	0.6870	0.0005	0.0005
14	BEARING HU-5S	A	BOLT NAS625H18	0.3125	0.3110	0.0015	0.0015
15	SUPPORT 265-210403	A	BUSHING 4B20M-S5-006	0.4380	0.4385	0.0005	0.0005
		B	BUSHING 4B21M-S5-013	0.4380	0.4355	0.0025	0.0035
16	BUSHING 4B21M-S5-013	A	BOLT NAS625H18	0.3130	0.3110	0.0020	0.0030
17	BUSHING 4B20M-S5-006	A	BOLT NAS625H18	0.3130	0.3110	0.0020	0.0030

REBUSHING DATA

ITEM NO.	DESCRIPTION	HOLE	REAM DIA (MAX)	BUSHING MATERIAL	BUSHING HEAT-TREAT (PSI)	BUSHING FIN. ID (MIN)	BUSHING FIN. ID (MAX)
1	SUPPORT 265-220401	A	0.3850				
2	BUSHING 4B20M-S4-004	A	B C	4130 OR 4135 STEEL TUBING	125,000 TO 145,000	0.2500	0.2505
3	SUPPORT 265-210417	A	1.0725				
4	BUSHING 246-24429	A	B C	4130 OR 4135 STEEL TUBING		0.9009	0.9014
5	BEARING BR-4	A		REPLACE WORN PART.			
6	CAP 265-210402	A	0.8130	A	A	0.7495	0.7505
7	BEAM 265-210412	A	0.8130	D	D	0.7495	0.7505
		B		REPLACE WORN PART.			
8	RETAINER 246-21408-3	A		REPLACE WORN PART.			
9	BEARING HSB6-12SA	A		REPLACE WORN PART.			
10	SUPPORT 265-313459 (LH)	A	0.8850				
10	SUPPORT 265-313463 (RH)	A	0.8850				
11	BUSHING 265-210413 (LH)	A	B	4130 STEEL BAR	140,000 TO 160,000	0.7500	0.7505
11	BUSHING 4B19-S12-008 (RH)	A	B	4130 STEEL TUBING	125,000 TO 145,000		
12	FITTING 265-522098	A		REPLACE WORN PART.			
13	RETAINER 265-522100	A		REPLACE WORN PART.			
14	BEARING HU-5S	A		REPLACE WORN PART.			
15	SUPPORT 265-210403	A	0.4485				
		B	0.4485				
16	BUSHING 4B20M-55-006	A	B C	4130 OR 4135 STEEL TUBING	125,000 TO 145,000	0.3120	0.3130
17	BUSHING 4B20M-55-008	A	B C	4130 OR 4135 STEEL TUBING	125,000 TO 145,000	0.3120	0.3130

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INFORMATION.

A USE 4B26 (SALVAGE) BUSHING. (SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION.)

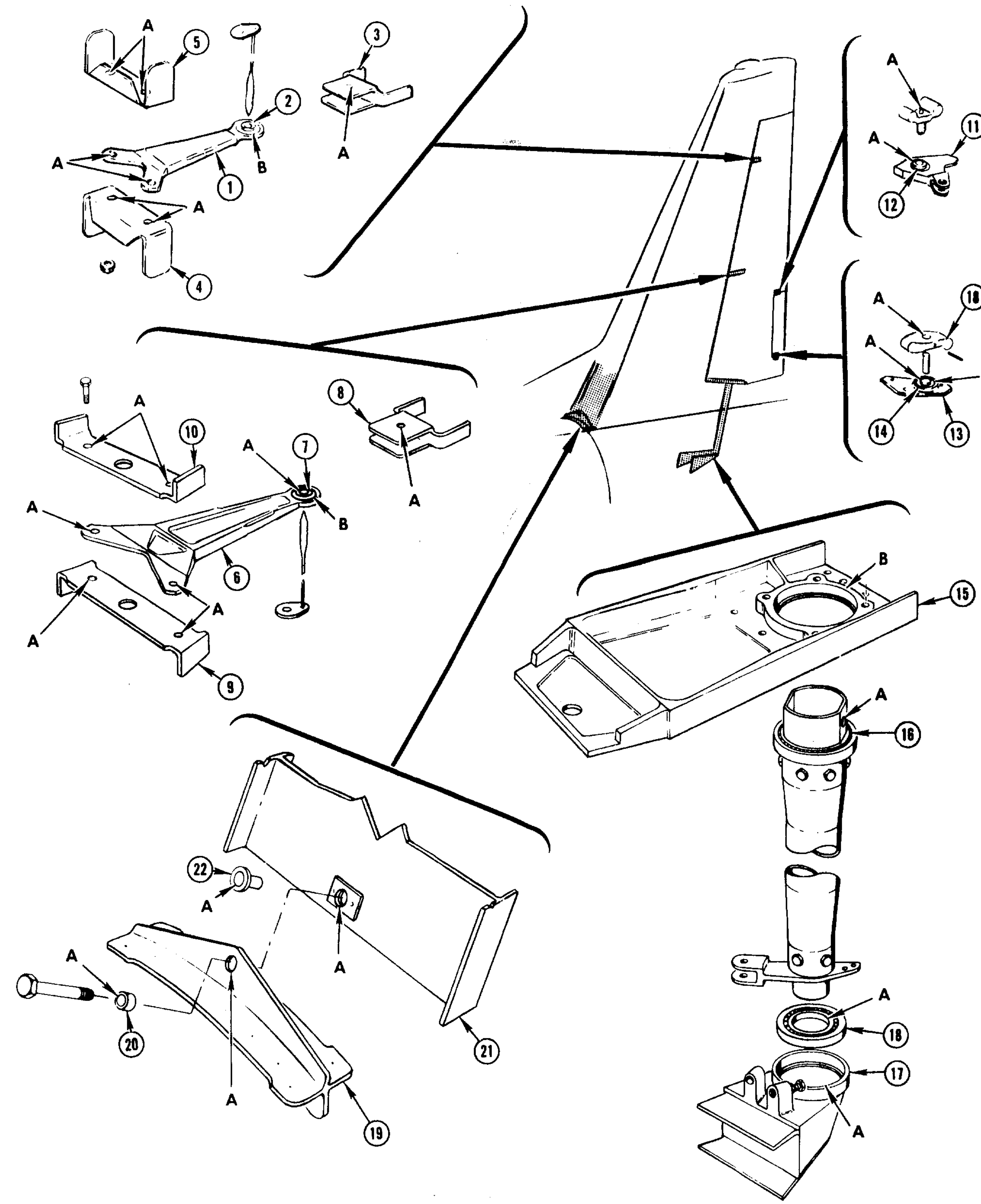
B REPLACE WITH LIKE PART WHEN BUSHING IS WORN. REPLACE WITH OVERSIZE OD BUSHING WHEN BUSHING HOUSING IS WORN.

C BUSHING IS PRESS FIT.

D REFER TO "HORIZONTAL STABILIZER CENTERBEAM -BUSHING REPAIR" IN CHAPTER 55.

E MODEL NA 265-40, -60, AND -70.

F MODEL NA 265-60A, —60SC, -65, -80, -80A, AND -80SC.



AW & RD — Vertical Stabilizer/Rudder Fittings
Figure 7

Table 7. AW & RD — Vertical Stabilizer/Rudder Fittings

WEAR ALLOWANCES

ITEM NO.	DESCRIPTION		HOLE	SHAFT	MFD HOLE ID (MAX)	MFD SHAFT OD (MIN)	MFD ALLOWANCE (MAX)	WEAR ALLOWANCE (MAX)
1	SUPPORT	265-240419	A	BOLT NAS1104-6W	0.2540	0.2485	0.0055	0.0070
			B	BEARING AN200KS4	0.9014	0.9009	0.0005	0.0005
2	BEARING	AN200KS4	A	PIN 265-240422-3	0.2500	0.2487	0.0013	0.0013
3	BRACKET	265-240209-5	A	PIN 265-240422-3	0.2510	0.2487	0.0023	0.0033
4	SUPPORT	265-230321	A	BOLT NAS1104-6W	0.2540	0.2485	0.0055	0.0065
5	SUPPORT	265-230322	A	BOLT NAS1104-6W	0.2540	0.2485	0.0055	0.0065
6	SUPPORT	265-240428-11	A	BOLT NAS1104-12W	0.2540	0.2485	0.0055	0.0070
			B	BEARING B-4	1.0000	0.9995	0.0005	0.0005
7	BEARING	B-4	A	PIN 265-240412-3	0.2500	0.2487	0.0013	0.0013
8	BRACKET	265-240209-3	A	PIN 265-240412-3	0.2510	0.2487	0.0023	0.0030
9	SUPPORT	265-230427	A	BOLT NAS1104-12W	0.2540	0.2485	0.0055	0.0070
10	SUPPORT	265-230428	A	BOLT NAS1104-12W	0.2540	0.2485	0.0055	0.0070
11	CLEVIS	265-240425	A	BEARING AN200KS3L	0.6250	0.6245	0.0005	0.0005
12	BEARING	AN200KS3L	A	PIN 265-240427-5	0.1900	0.1875	0.0025	0.0025
13	RETAINER	265-240426	A	BEARING AN200KS3L	0.6250	0.6245	0.0005	0.0005
14	BEARING	AN200KS3L	A	PIN 265-240424-5	0.1900	0.1875	0.0025	0.0025
15	SUPPORT	265-240417	A	BEARING KP37BS	3.2535	3.2490	0.0045	0.0045
16	BEARING	KP37BS	A	SUPPORT 265-240409	2.3130	2.3090	0.0040	0.0040
17	SUPPORT	265-240406	A	BEARING KP21BS	2.2510	2.2490	0.0020	0.0020
18	BEARING	KP21BS	A	HORN 265-240407	1.3130	1.3090	0.0040	0.0040
19	SUPPORT	265-313424	A	BUSHING 4B19-S6-005	0.5010	0.5010	0.0000	0.0010
20	BUSHING	4B19-S6-005	A	BOLT MS20006-8	0.3755	0.3727	0.0028	0.0040
21	BEAM	265-230301	A	BUSHING 4BM20-S6-005	0.5005	0.5010	0.0005	0.0005
22	BUSHING	4BM20-S6-005	A	BOLT MS20006-8	0.3755	0.3727	0.0028	0.0040

REBUSHING DATA

ITEM NO.	DESCRIPTION		HOLE	REAM DIA (MAX)	BUSHING			
					MATERIAL	HEAT-TREAT (PSI)	FIN. ID (MIN)	FIN. ID (MAX)
1	SUPPORT	265-240419	A	0.282	A	A	0.2490	0.2540
			B		REPLACE WORN PART.			
2	BEARING	AN200KS4	A		REPLACE WORN PART.			
3	BRACKET	265-240209-5	A		REPLACE WORN PART.			
4	SUPPORT	265-230231	A		USE NEXT LARGER SIZE FASTENER.			
5	SUPPORT	265-230322	A		USE NEXT LARGER SIZE FASTENER.			
6	SUPPORT	265-240428-11	A	0.282	A	A	0.2490	0.2540
			B		REPLACE WORN PART.			
7	BEARING	B-4	A		REPLACE WORN PART.			
8	BRACKET	265-240209-3	A		REPLACE WORN PART.			
9	SUPPORT	265-230427	A		REPLACE WORN PART.			
10	SUPPORT	265-230428	A		REPLACE WORN PART.		0.2490	0.2540
11	CLEVIS	265-240425	A		REPLACE WORN PART.			
12	BEARING	AN200KS3L	A		REPLACE WORN PART.			
13	RETAINER	265-240426	A		REPLACE WORN PART.			
14	BEARING	AN200KS3L	A		REPLACE WORN PART.			
15	SUPPORT	265-240417	A		REPLACE WORN PART.			
16	BEARING	KP37BS	A		REPLACE WORN PART.			
17	SUPPORT	265-240406	A		REPLACE WORN PART.			
18	BEARING	KP21BS	A		REPLACE WORN PART.			
19	SUPPORT	265-313424	A	0.5115				
20	BUSHING	4B19-S6-005	A	B	4130 OR 4135 STEEL TUBING	125,000 TO 145,000	0.3745	0.3755
21	BEAM	265-230301	A	0.5115				
22	BUSHING	4BM20-S6-005	A	B	4130 OR 4135 STEEL TUBING	125,000 TO 145,000	0.3745	0.3755

NOTES

- REFER TO "WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS" FOR ADDITIONAL INFORMATION.

A USE 4B26 (SALVAGE) BUSHING. (SEE "BUSHING MANUFACTURE AND INSTALLATION" ILLUSTRATION.)

B REPLACE WITH LIKE PART WHEN BUSHING IS WORN. REPLACE WITH OVERSIZE OD BUSHING WHEN BUSHING HOUSING IS WORN.

STRUCTURAL JOINT WEAR

REPAIR

WEAR AND BUSHING (REBUSHING) OF STRUCTURAL JOINTS

Details necessary for the manufacture and installation of bushings referenced in figures 1 thru 7 are given in tables 201 thru 203. Two of the bushings shown (4B19 and 4B20) are NAA standard parts used in the original design. The third bushing (4B26) is an NAA thin-wall "salvage" bushing that may have been used when a hole was inadvertently made too large.

Worn 4B19 and 4B20 bushings would normally be replaced with bushings of like dimensions; however, if the hole receiving the bushing is worn or corroded, an oversize bushing must be used. The permissible oversize is given in tables 1 thru 7. Worn holes not previously bushed may be bushed with either a 4B19 or a 4B20 bushing as directed in tables 1 thru 7.

Hole Preparation

Ream holes to accommodate oversize (OD) bushings (bearings) as indicated in table 1 thru 7. (Refer to interference fit chart in tables 201 thru 203. The inside surface of the reamed hole should have a 125 (or finer) microinch finish. When bushing is to be staked, break shoulder 0.005 in. (maximum). When bushing is not to be staked, break shoulder 0.005 to 0.015 in.

Bushing Installation

Lubricate parts with wet zinc-chromate primer and press bushing or bearings into place. Stake bearing when required and line-ream to finish size. Paint outer edges of bushing (bearing) with zinc-chromate primer to seal joint.

To facilitate installation, the bushing or bearing may be shrunk by means of a dry-ice soak. Allow part to remain in dry ice until it is thoroughly chilled.

BEARING RETAINER FLANGE EXPANDING TOOL

Details and dimensions of the bearing retainer flange expander tool components are shown in figure 201. To use bearing retainer flange expander tool, proceed as follows:

Procedure

1. Assemble bearing flange expander tool through bearing, bearing retainer, and structure containing bearing retainer.
2. Position three steel forming balls in indexed holes of forming head.

NOTE

If the flange is to be formed inward, the initial position of the forming balls should be at a diameter slightly larger than the outside diameter of the flange being formed. If the flange is being formed outward, the initial location of the forming balls should be a diameter slightly smaller than the inside diameter of the flange being formed.

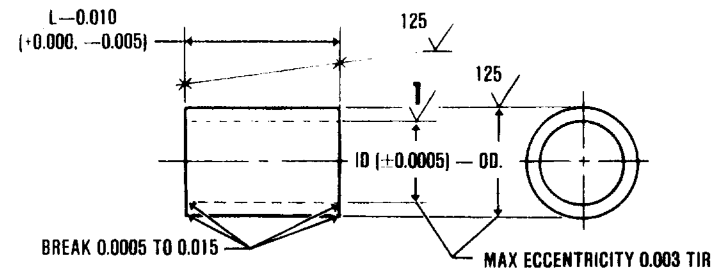
3. Coat steel forming balls and thrust washer with light grease.

CAUTION

If excessive pressure is applied on the compression nut, it will result in indentions to the flange, which will make forming difficult.

4. Tighten compression nut so that a slight, even pressure is applied to flange being formed.
5. Using a socket and ratchet handle, rotate expander tool a minimum of five revolutions.
6. Tighten compression nut and repeat forming operation until flange is formed as far as possible with forming balls at present location.
7. Loosen compression nut and relocate forming balls to next indexed position (either inward or outward, as required).
8. Continue forming operation until retainer flange is tight against surface.

Table 201. Bushing Manufacture and Installation—4B19—Standard Wall Bushing



MATERIAL: AS DESIGNATED BY SYMBOL IN PART NUMBER

SYMBOL
B
C
S

MATERIAL
AL BRONZE BAR, AMS4631
17-4PH CRES BAR, NAA SPEC LB0160-133
4130 STEEL TUBING, MIL. SPEC MIL-T-6736, COND N
4135 STEEL TUBING, AMS6372

HEAT-TREAT: HEAT-TREAT STEEL 125 TO 145 KSI ACCORDING TO MIL. SPEC MIL-H-6875.
HEAT-TREAT 17-4PH CRES 155 TO 185 KSI ACCORDING TO MIL. SPEC MIL-H-6875.

FINISH: AL BRONZE OR 4130 AND 4135 STEEL
CADIMUM-PLATE ACCORDING TO FED. SPEC QQ-P-416, TYPE II, CLASS 3, ALL SURFACES EXCEPT ID.

MAGNETIC INSPECTION: ACCORDING TO MIL. SPEC MIL-I-6868 IF INDICATED BY SUMBOL IN PART NUMBER.

PART NUMBER CODE:

- DRAWING NO.
- MAGNETIC INSPECTION FOR STEEL BUSHING ONLY WHEN REQD.
- MATERIAL SYMBOL.
- FIRST DASH NO. INDICATES DIAMETRAL DIMENSIONS. (SEE TABLE.)
- LAST DASH NO. INDICATES L IN IN. AND 32NDS.

4B19M-S12-102 FOR EXAMPLE: 102 INDICATES 1-1/16
100 INDICATES 1
010 INDICATES 5/16

DIMENSIONS APPLY BEFORE PLATING.

FIRST DASH NO.	DIMENSIONS	
	ID	OD [A]
3	0.1900	0.3140 +0.0000 −0.0005
4	0.2500	0.3765 +0.0000 −0.0005
5	0.3125	0.4390 +0.0000 −0.0005
6	0.3750	0.5015 +0.0000 −0.0005
7	0.4375	0.5645 +0.0000 −0.0010
8	0.5000	0.6270 +0.0000 −0.0010
9	0.5625	0.6895 +0.0000 −0.0010
10	0.6250	0.7520 +0.0000 −0.0010
11	0.6875	0.8145 +0.0000 −0.0010
12	0.7500	0.6770 +0.0000 −0.0010
14	0.8750	1.0020 +0.0000 −0.0010
16	1.0000	1.1275 +0.0010 −0.0010
18	1.1250	1.2525 +0.0000 −0.0010
20	1.2500	1.3775 +0.0000 −0.0010
22	1.3750	1.5025 +0.0000 −0.0010
24	1.5000	1.6275 +0.0000 −0.0010
26	1.6250	1.7525 +0.0000 −0.0010
28	1.7500	1.8775 +0.0000 −0.0010
30	1.8750	2.0025 +0.0000 −0.0010
32	2.0000	2.1275 +0.0000 −0.0010
36	2.2500	2.3775 +0.0000 −0.0010
40	2.5000	2.6275 +0.0000 −0.0010

INTERFERENCE FIT

BUSHING OD (IN.)	INTERFERENCE	
	MIN	MAX
UP TO 1/2	0.0005	0.0020
1/2 TO 1	0.0005	0.0025
OVER 1	0.0010	0.0030

NOTES

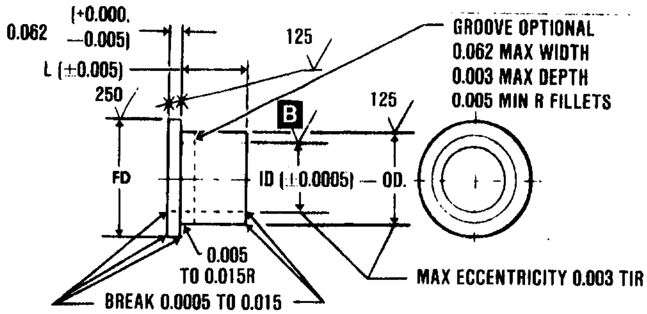
[A] OD OF A REPLACEMENT BUSHING MAY BE INCREASED TO ACCOMMODATE WORN HOLE WHEN PERMITTED, AND TO THE EXTENT PERMITTED, IN WEAR AND REBUSHING DATA CHARTS.

- SURFACE ROUGHNESS IS 125 FOR BUSHINGS WITH L EQUAL TO (OR LESS THAN) THREE TIMES THE ID; 250 WHEN L IS GREATER THAN THREE TIMES THE ID.

INSTALLATION DATA

DIMENSION L IS 0.010 TO 0.015 IN. SHORTER THAN THE THICKNESS OF THE BUSHED PART.

Table 202. Bushing Manufacture and Installation—4B20—Flanged Bushing



MATERIAL: AS DESIGNATED BY SYMBOL IN PART NUMBER

SYMBOL	MATERIAL
B	AL BRONZE BAR, AMS4631
C	17-4PH CRES BAR, NAA SPEC LB0160-133
S	4130 STEEL TUBING, MIL. SPEC MIL-T-6736, COND N 4135 STEEL TUBING, AMS6372

HEAT-TREAT: HEAT-TREAT STEEL 125 TO 145 KSI ACCORDING TO MIL. SPEC MIL-H-6875.
HEAT-TREAT 17-4PH CRES 155 TO 185 KSI ACCORDING TO MIL. SPEC MIL-H-6875.

FINISH: AL BRONZE OR 4130 AND 4135 STEEL
CADIMUM-PLATE ACCORDING TO FED. SPEC QQ-P-416, TYPE II, CLASS 3, ALL SURFACES EXCEPT ID.

MAGNETIC INSPECTION: ACCORDING TO MIL. SPEC MIL-I-6868 IF INDICATED BY SUMBOL IN PART NUMBER.

PART NUMBER CODE:
- DRAWING NO.
- MAGNETIC INSPECTION FOR STEEL BUSHING ONLY WHEN REQD.
- MATERIAL SYMBOL.
- FIRST DASH NO. INDICATES DIAMETRAL DIMENSIONS. (SEE TABLE.)
- LAST DASH NO. INDICATES L IN IN. AND 32NDS.
  FOR EXAMPLE: 102 INDICATES 1-1/16
  100 INDICATES 1
  010 INDICATES 5/16

4B20M-S12-102

DIMENSIONS APPLY BEFORE PLATING.

FIRST DASH NO.	DIMENSIONS		
	ID	OD A	FD
3	0.1900	0.3140 +0.0000 −0.0005	0.438
4	0.2500	0.3765 +0.0000 −0.0005	0.500
5	0.3125	0.4390 +0.0000 −0.0005	0.562
6	0.3750	0.5015 +0.0000 −0.0005	0.625
7	0.4375	0.5645 +0.0000 −0.0010	0.688
8	0.5000	0.6270 +0.0000 −0.0010	0.750
9	0.5625	0.6895 +0.0000 −0.0010	0.812
10	0.6250	0.7520 +0.0000 −0.0010	0.875
11	0.6875	0.8146 +0.0000 −0.0010	0.938
12	0.7500	0.8770 +0.0000 −0.0010	1.000
14	0.8750	1.0020 +0.0000 −0.0010	1.125
16	1.0000	1.1275 +0.0000 −0.0010	1.250
18	1.1250	1.2525 +0.0000 −0.0010	1.375
20	1.2500	1.3775 +0.0000 −0.0010	1.500
22	1.3750	1.5025 +0.0000 −0.0010	1.625
24	1.5000	1.6275 +0.0000 −0.0010	1.750
26	1.6250	1.7525 +0.0000 −0.0010	1.875
28	1.7500	1.8775 +0.0000 −0.0010	2.000
30	1.8750	2.0025 +0.0000 −0.0010	2.125
32	2.0000	2.1275 +0.0000 −0.0010	2.250
36	2.2500	2.3775 +0.0000 −0.0010	2.500
40	2.5000	2.6275 +0.0000 −0.0010	2.750

INSTALLATION DATA

INTERFERENCE FIT

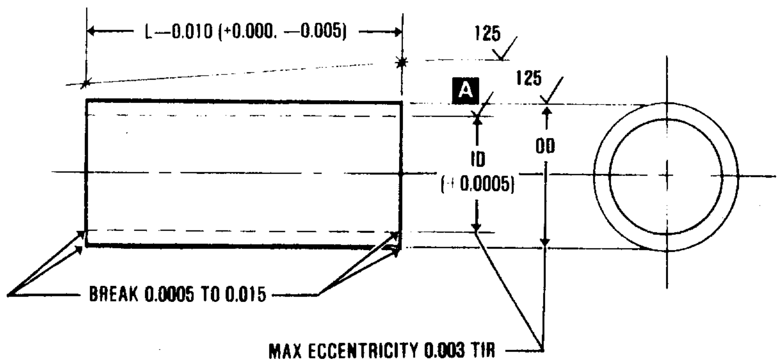
BUSHING OD (IN.)	INTERFERENCE	
	MIN	MAX
UP TO 1/2	0.0005	0.0020
1/2 TO 1	0.0005	0.0025
OVER 1	0.0010	0.0030

NOTES

A OD OF A REPLACEMENT BUSHING MAY BE INCREASED TO ACCOMMODATE WORN HOLES WHEN PERMITTED, AND TO THE EXTENT PERMITTED, IN WEAR AND REBUSHING DATA CHARTS.

B SURFACE ROUGHNESS IS 125 FOR BUSHINGS WITH L EQUAL TO (OR LESS THAN) THREE TIMES THE ID; 250 WHEN L IS GREATER THAN THREE TIMES THE ID.

Table 203. Bushing Manufacture and Installation—4B26—Thin-Wall (Salvage) Bushing



DIMENSIONS APPLY BEFORE PLATING.

FIRST DASH NO.	DIMENSIONS	
	ID	OD A
3	0.1900	0.2515 +0.0000 −0.0005
4	0.2500	0.3140 +0.0000 −0.0005
5	0.3125	0.3765 +0.0000 −0.0005
6	0.3750	0.4390 +0.0000 −0.0005
7	0.4375	0.5015 +0.0000 −0.0005
8	0.5000	0.5645 +0.0000 −0.0010
9	0.5625	0.6270 +0.0000 −0.0010
10	0.6250	0.6895 +0.0000 −0.0010
11	0.6875	0.7520 +0.0000 −0.0010
12	0.7500	0.8145 +0.0000 −0.0010
14	0.8750	0.9395 +0.0000 −0.0010
16	1.0000	1.0650 +0.0000 −0.0010

MATERIAL: 4130 STEEL BAR MIL. SPEC
MIL-S-6758

HEAT-TREAT: 160,000 to 180,000 PSI ACCORDING TO MIL. SPEC MIL-S-6758.

FINISH: CADIMUM-PLATE 0.0002 TO 0.0004
THICKNESS, ACCORDING TO FED SPEC
QQ-P-416 ALL SURFACES EXCEPT ID.

MAGNETIC INSPECTION: ACCORDING TO MIL. SPEC MIL-I-6868
BY SUMBOL IN PART NUMBER.

PART NUMBER CODE:

- DRAWING NO.
- MAGNETIC INSPECTION WHEN REQUIRED.
- FIRST DASH NO. INDICATES DIAMETRAL DIMENSIONS. (SEE TABLE)
- LAST DASH NO. INDICATES L IN IN. AND 32NDS.

4B26M-3-016

FOR EXAMPLE: 102 INDICATES 1-1/16
016 INDICATES 1/2

INTERFERENCE FIT

BUSHING OD (IN.)	INTERFERENCE	
	MIN	MAX
UP TO 1/2	0.0005	0.0020
1/2 TO 1	0.0005	0.0025
OVER 1	0.0010	0.0030

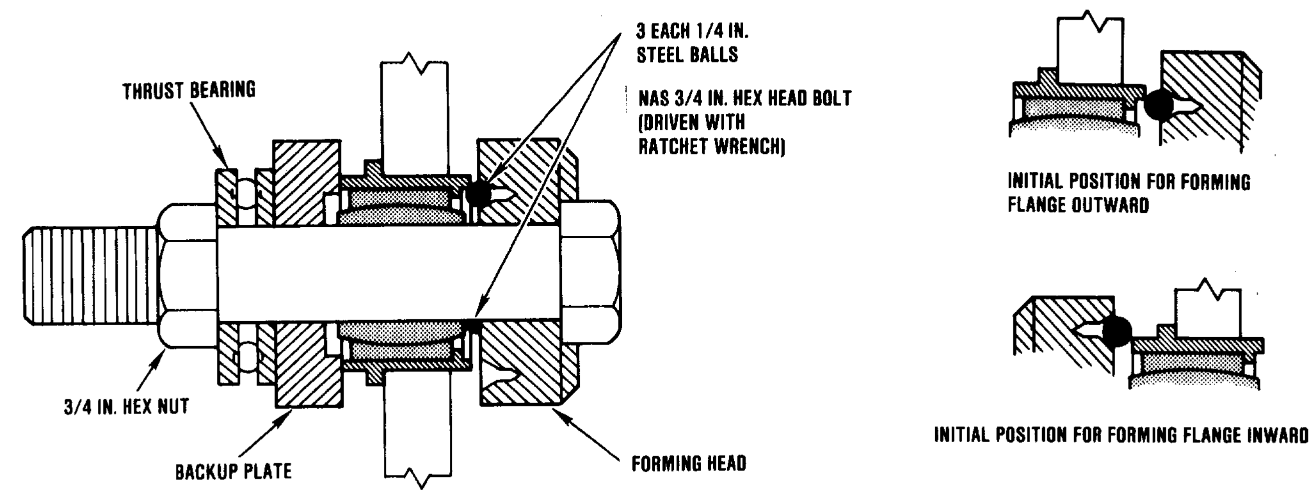
INSTALLATION DATA

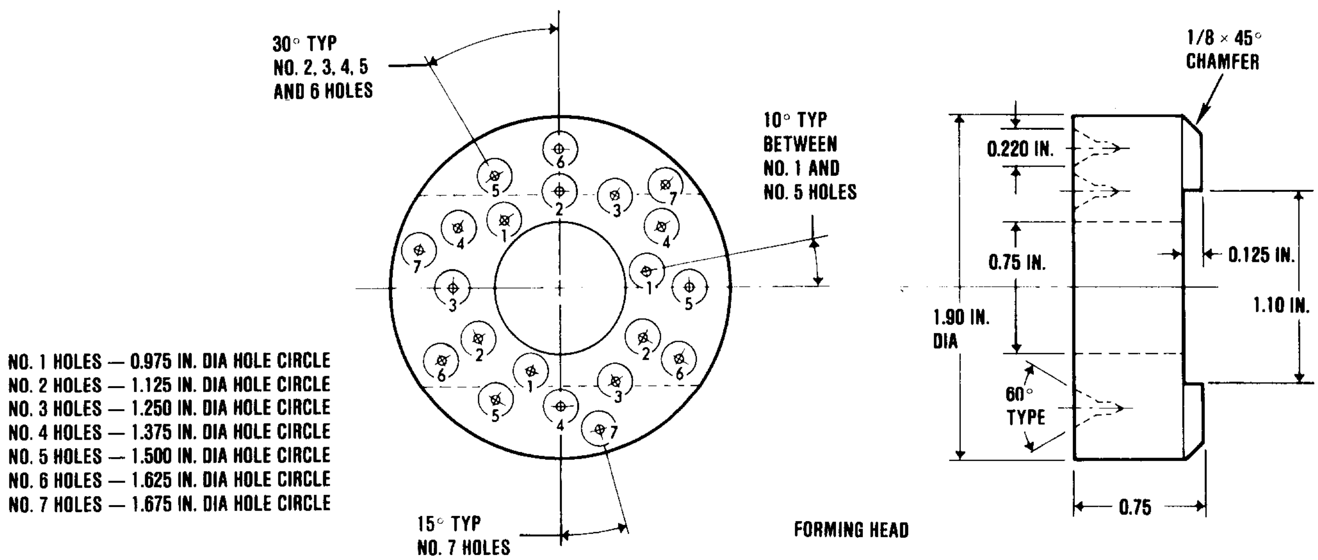
DIMENSION L IS 0.010 TO 0.015 IN. SHORTER THAN THE THICKNESS OF THE BUSHED PART.

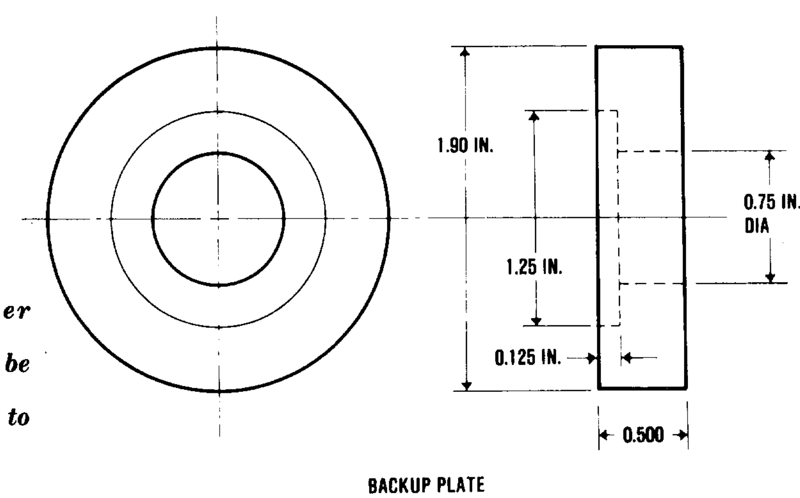
NOTES

A SURFACE ROUGHNESS IS 125 FOR BUSHINGS WITH L EQUAL TO (OR LESS THAN) THREE TIMES THE ID; 250 WHEN L IS GREATER THAN THREE TIMES THE ID.

- THE 4B26 BUSHING IS NOT CALLED OUT ON MANUFACTURING DRAWINGS. HOWEVER, IT MAY HAVE BEEN USED AS A SALVAGE BUSHING. THIS BUSHING MAY ALSO BE USED TO BUSH WORN HOLES (NOT PREVIOUSLY BUSHED) WHEN SO DIRECTED IN WEAR AND REBUSHING DATA CHARTS.







NOTES

- ***Break all sharp edges.***
- ***Cadmium plate per QQ-P-416.***
- ***Heat-treat to Rockwell C36-40 per MIL-H-6875.***
- ***Each series of three countersunk holes to be the same depth as nearly as possible.***
- ***This assembly can be adapted for use to other bearing installations.***

Bearing Retainer Flange Expanding Tool
Figure 201

SELECTION AND INSTALLATION OF ACRES FASTENER SLEEVES MIL-S-85069

51-1. ACRES FASTENER SLEEVES.

51-2. INTRODUCTION. Acres Fastener Sleeves are precision formed, thin wall, tubular elements with a flared end. These sleeves were developed to meet several specific needs such as bushing oversize holes, protecting from corrosion, and to aid sealing.

51-3. PURPOSE. The primary purpose for Acres Fastener Sleeves is to repair enlarged holes. The sleeves come in standard fastener diameters with standard fastener heads. The sleeves are generally 1 inch long and are adjusted to the length of fastener being used. Acres Sleeves may be bonded into areas where holes need protection such as vent holes, drain holes, or through composite structure.

51-4. DESCRIPTION. Acres Fastener Sleeves are manufactured from A286 stainless steel. There are in general four head styles; three flush and one protruding. (See Table 205.) The sleeves have grooves on the shank spaced 1/16 of an inch apart for two reasons. The first reason is to trap sealant in between the sleeve and the wall of the hole to afford better seals. The second reason being to aid in adjusting the sleeve to length. MIL-S-85069 and associated slash pages cover the fastener sleeves as shown in Table 204.

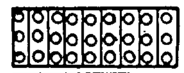
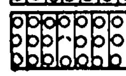
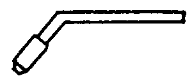
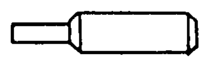
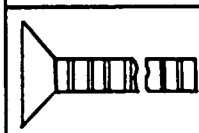
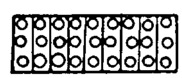
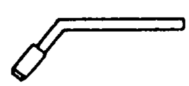
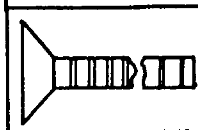
Table 204. MIL-SPEC Numbers for Acres Fastener Sleeves

Oversize	Specification	Description
1/64	MIL-S-85069/2	Sleeves, fastener, grooved, protruding head (shear and tension), 1/64 oversize.
	MIL-S-85069/3	Sleeves, fastener, grooved, 100° flush reduced head (shear), 1/64 oversize.
	MIL-S-85069/4	Sleeves, fastener, grooved, 100° flush head (i.e., MS20426), 1/64 oversize.
	MIL-S-85069/5	Sleeves, fastener, grooved, 100° flush full head (tension, i.e., AN509), 1/64 oversize.
1/32	MIL-S-85069/6	Sleeves, fastener, grooved, protruding head, (shear and tension), 1/32 oversize.
	MIL-S-85069/7	Sleeves, fastener, grooved, 100° flush reduced head (shear), 1/32 oversize.
	MIL-S-85069/8	Sleeves, fastener, grooved, 100° flush head (i.e., MS20426), 1/32 oversize.
	MIL-S-85069/9	Sleeves, fastener, grooved, 100° flush full head (tension, i.e., AN509), 1/32 oversize.

NOTE

Acres sleeves are not to be used with expandable type fasteners.

Table 205. Acres Fastener Sleeves Styles

	MIL-S-85069 Configuration	For Fast. With These Head Styles	Sleeve Vendor Part Number	Tooling	Description	Tool Part Number
FIRST INCREMENT OVERSIZE 1/64	 MIL-S-85069/2	Prot. Hd. Fasteners Shear and Tension	JK5517CXX	  05,55 Dia Only	Step Plate Step Plate	JK6555-XX JK6557-05 JK6557-55
	 MIL-S-85069/3	Reduced Shear Flush Hd. (NAS1097)	JK5512CXX		Break Off Handle	JK6548-XX
	 MIL-S-85069/4	Shear Flush Head (MS20426)	JK5514CXX		Inserting Tool Inter-ference Only	JK6536-XX
	 MIL-S-85069/5	Tension Flush Head (AN509)	JK5516CXX		Removing Tool	JK6526-XX
SECOND INCREMENT OVERSIZE 1/32	 MIL-S-85069/6	Prot. Hd. Fasteners Shear and Tension	JK5577C XX		Step Plate	JK6556-XX
	 MIL-S-85069/7	Reduced Shear Flush Head (NAS1097)	JK5572C XX		Break Off Handle	JK6546-XX
	 MIL-S-85069/8	Shear Flush Head (MS20426)	JK5574C XX		Inserting Tool	JK6536-XX
	 MIL-S-85069/9	Tension Flush Head (AN509)	JK5576C XX		Removing Tool	JK6524-XX

NEW

SELECTION AND INSTALLATION OF ACRES FASTENER SLEEVES MIL-S-85069

51-5. OVERSIZE FASTENER SLEEVES, TYPE I.

a. Type I, Class 1,
First Oversize, 1/64
MIL-S-85069/(2-5)

b. Type I, Class 2,
Second Oversize, 1/32
MIL-S-85069/(6-9)

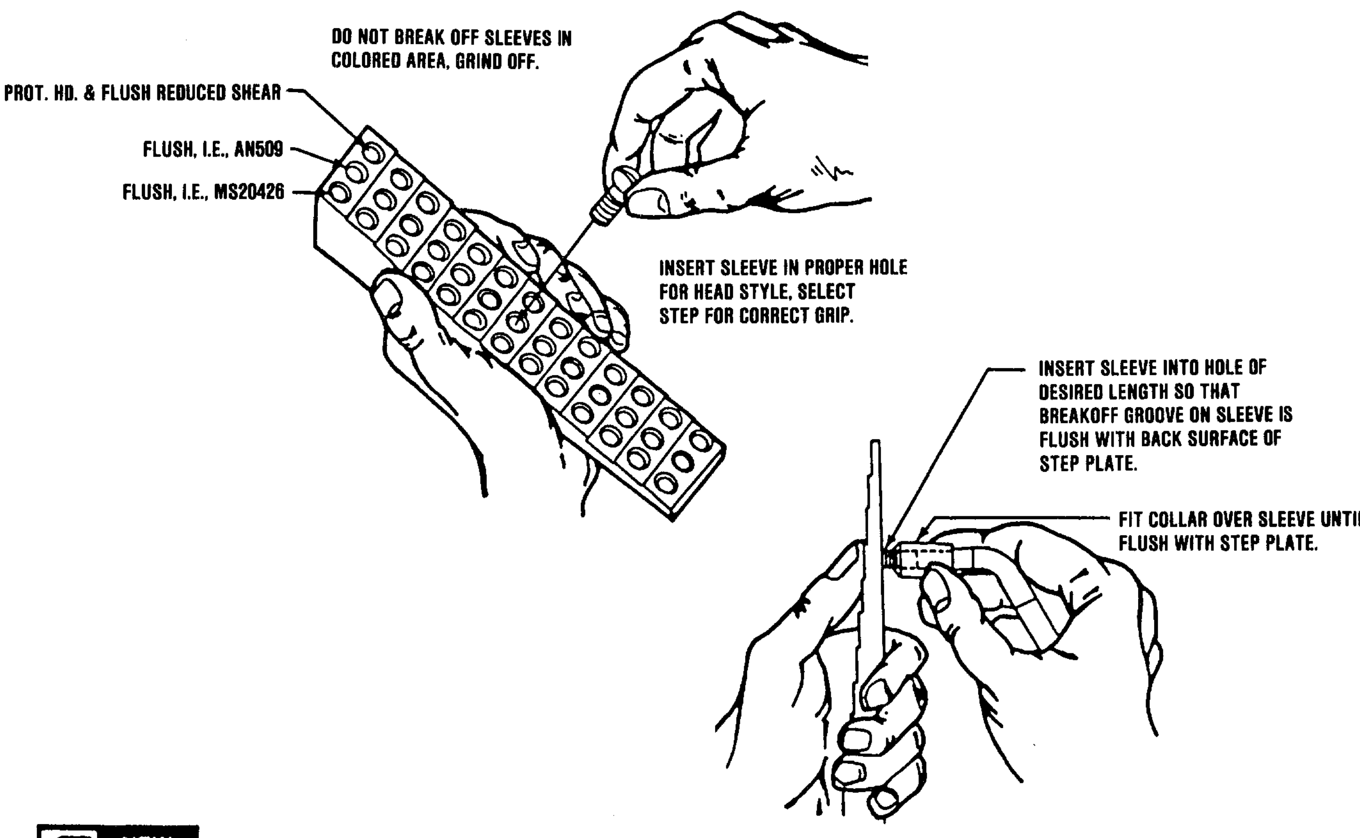
51-6. Drill or ream the hole for the application fastener and sleeve in accordance with applicable slash sheet. If flush head fasteners are to be installed, the countersink in the material will have to be deepened 0.005 for 1/64 and 0.010 for 1/32 oversize to accommodate the countersunk portion of the sleeve. The installed sleeve and fastener shall meet the applicable aerodynamics smoothness requirements on exterior surfaces. Except where a smoother finish is specified on the engineering drawing or in the fastener installation document, the surface finish of the hole shall not exceed 125 RHR as defined in ANSI-B-46.1.

51-7. Sleeve shall correspond to the fastener configuration (flush or protruding head), fastener application (tension or shear), and fastener diameter. See slash sheet. Each type of sleeve is stocked in only one length. Diameters #10 through 3/8 inch have a 1-inch grip length. All sleeves have external circumferential grooves spaced 1/16 inch apart over the straight portion of their grip length.

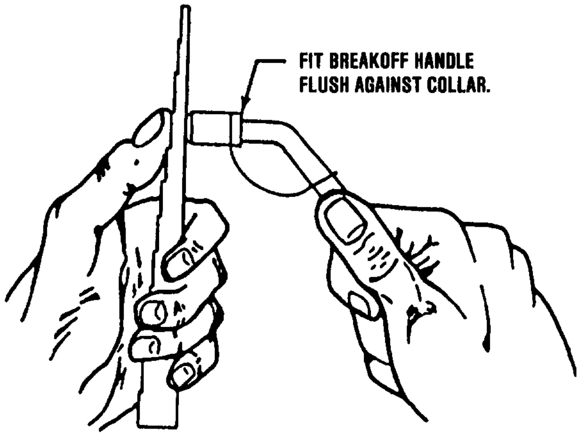
51-8. Sleeves shall be prepared for installation by breaking or grinding them off at a groove so that the grip length will be the same as the fastener grip length. If the grip length or the fastener is longer than the maximum length of the sleeves as listed in paragraph 51-7, an additional cylindrical section broken from a second sleeve may be used to make up the required fastener grip length. Do not use a section of sleeve less than 1/4 of an inch long. Break off tools listed in Table 205 must be used.

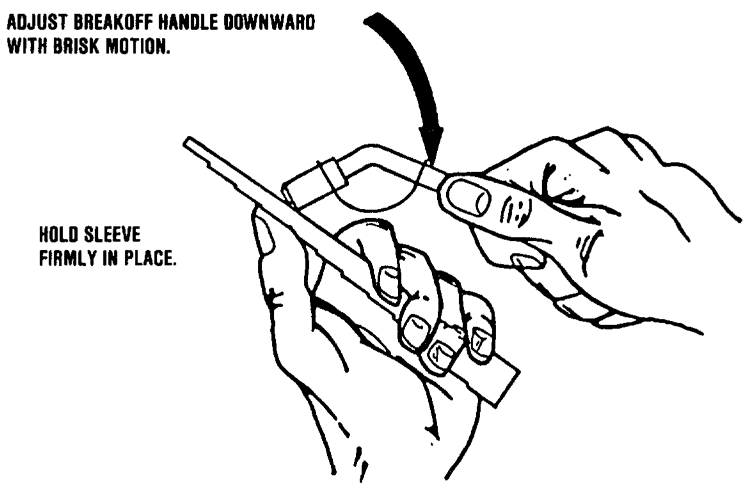
51-9. ADJUSTING TO LENGTH.

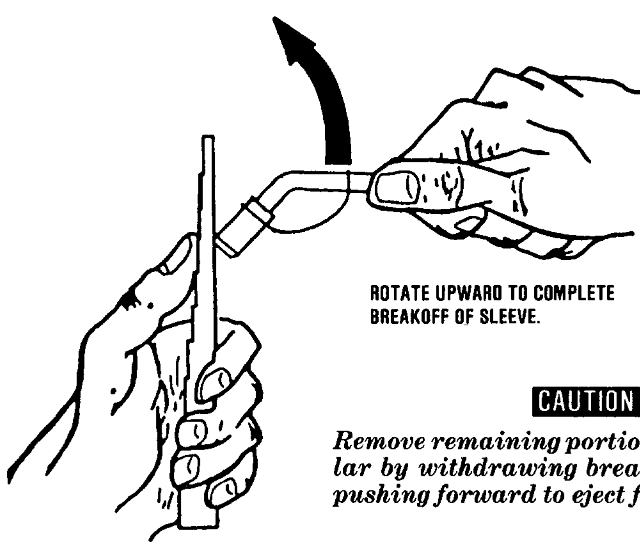
51-10. Using step plate (see Table 205) and breakoff handle (see Table 205), break sleeve to length per Figures 202 and 203.



Adjusting Sleeve to Length
Figure 202 (Sheet 1 of 2)







CAUTION

Remove remaining portion of sleeve in collar by withdrawing breakoff handle then pushing forward to eject from collar.

Adjusting Sleeve to Length
Figure 202 (Sheet 2 of 2)

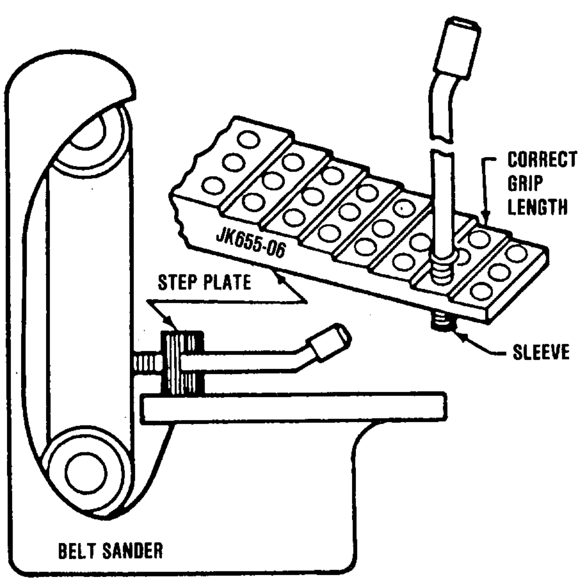
SELECTION AND INSTALLATION OF ACRES FASTENER SLEEVES MIL-S-85069

51-11. ALTERNATE METHOD OF ADJUSTING SLEEVE TO LENGTH IN STRUCTURE. To adjust sleeve to length in a structure, be sure the structure sheets are firmly held together. Insert the sleeve into the hole until the head is fully seated. Examine the rear protrusion of the sleeve. If a groove is barely visible on the sleeve next to the sheet, use the breakoff handle to break off the protruding section of sleeve. If the back surface of the sheet falls in between grooves, use a standard washer, 1/32 inch thick, with the hole enlarged with the same drill or reamer used to manufacture the hole to accept the sleeve. Place this washer on the sleeve and push securely against the back sheet. Then using the breakoff handle, break off the portion of the sleeve standing above the washer. This will always leave the sleeve protruding slightly from the back sheet. The washer may be left on or may be removed and a nut or collar with the proper counterbore used on the bolt.

51-12. PROCEDURE FOR GRINDING SLEEVE TO PROPER LENGTH. (See Figure 203.)

51-13. INSTALLATION.

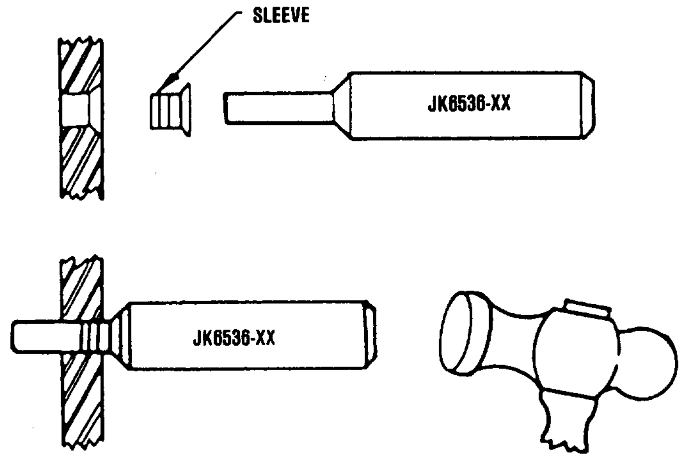
51-14. Fastener sleeves must be installed with reasonable care to insure that they function properly in inhibiting corrosion, sealing, and in serving to restore the structural integrity of joints in modification, repair or in the original manufacture of aerospace or military hardware. The installation information available and the processing specification should be followed. Various tools are available which facilitate and insure that the sleeve installations may be properly performed.



NOTES

1. *May also be ground on disc sander.*
2. *Deburr inside and out.*
3. *Do not grind the bottom of the step plate.*

Grinding Sleeve to Proper Length
Figure 203



Installing Fasteners and Sleeves
Figure 204

51-15. Fasteners and sleeves shall be installed wet with sealing compounds as required. A thin coat of material shall be applied to the exterior of the sleeve and the sleeve inserted into the hole. If there is an interference fit between the sleeve and the hole, inserting tool JK6536-XX shall be used to install the sleeve into the hole. The same material shall be applied to the shank of the fastener and the fastener inserted or driven into the sleeve. Do not allow the compound to cure before completing the installation. (See Figure 204.)

51-16. FLUSHING BACK SIDE WHEN NECESSARY.

51-17. Normally the sleeve does not need to be flush on the backside. The sleeve protrusion will fit into the same counterbore in the attaching nut or collar as an oversize bolt. A washer may be used when necessary.

51-18. When the sleeve must be flush on the back side it may be trimmed by using a counterbore or countersink in a cage. Adjust the cage to cut flush. A pilot on the cutting tool to fit the sleeve hole must be used. Cut slowly.

51-19. To keep the sleeve from turning it is helpful to have it in an interference fit. It may be bonded into the material and held by tools as shown in Figure 205.

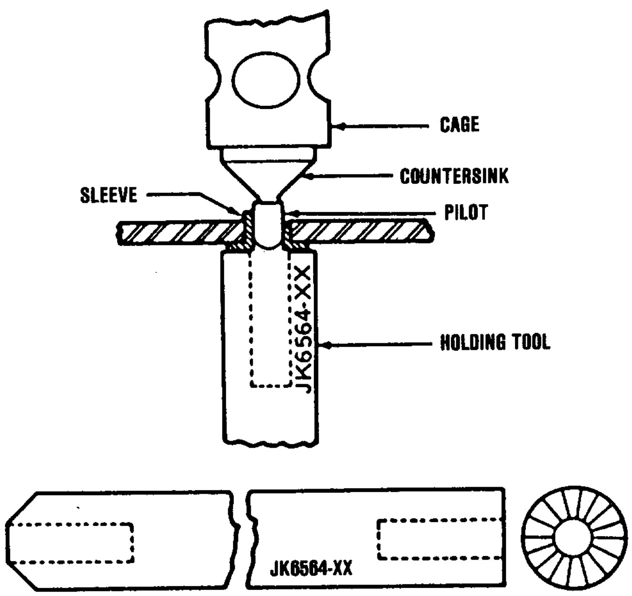
51-20. SLEEVES, FASTENERS, DESIGN AND USAGE LIMITATIONS.

SELECTION AND INSTALLATION OF ACRES FASTENER SLEEVES MIL-S-85069

51-21. Fastener sleeves replace oversize shank fasteners. Use the sleeves with standard diameter straight fasteners. Use fastener sleeves under the same restrictions as oversize fasteners and in compliance with the specific users repair procedures and restrictions.

51-22. RESTRICTED APPLICATIONS.

A. Fastener sleeves shall not be used in those applications utilizing tapered shank fasteners.



Bonding Sleeve
Figure 205

B. Fastener sleeves shall not be used in interference that exceeds 0.003 (hole to sleeve).

C. These repair sleeves will not be used with blind fasteners.

D. The fastener or attaching element (nut or collar) must contain a counterbore to accept the protrusion of the sleeve or a washer must be used or the sleeve may be flushed on the backside.

51-23. Procuring activity or the appropriate engineering organization (i.e., stress, strength, fatigue/fracture) approval is required for the following applications:

A. In fluid applications.

B. Fatigue and fracture critical locations.

C. Edge distance, measured from the center of the hole, is less than 1-1/2 diameter.

D. The number of discrepant holes being repaired in the pattern is greater than 10% of the total number of holes in the pattern.

E. More than three (3) adjacent holes are discrepant.

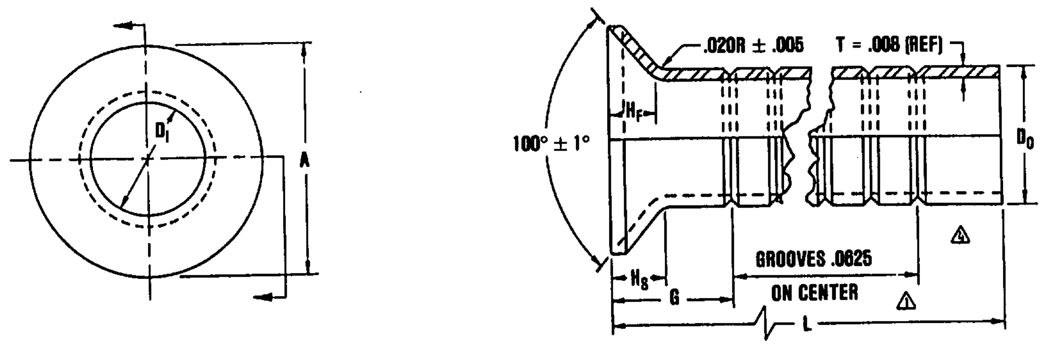
51-24. Deviation from any of the above requirements must be approved by the procuring agency.

51-25. APPLICATION.

A. When the edge distance measured from the center of the holes is 2D or greater, there is no restriction on the number or location of fasteners installed with sleeves.

B. Sleeves are to be used only on/with fasteners ranging from 5/32 through 3/8 inch nominal diameter and up to 2 inches thick stack up.

Table 206. Dimensions — Flush Shear Acres Fastener Sleeves



APPROVED CALLOUT	FOR BOLT SIZE (REF)	A DIA. ±.005	D_I DIA.	D_O DIA.	G	L MFG. ⚠1	H_F (REF)	H_S (REF)	HOLE PREP. ⚠2 DRILL NO.	DRILL DIA.	OPTIONAL HOLE ⚠3 DRILL NO.	DRILL DIA.
JK5514( )05( )( )	5/32	.282	.1565 / .1550	.1730 / .1720	.125	12	.053	.058	17	.1730	11/64	.1719
JK5514( )55( )( )	#8	.294	.1635 / .1620	.1800 / .1790	.125	12	.055	.060	15	.1800	*	.1785
JK5514( )06( )( )	#10	.347	.1895 / .1880	.2055 / .2045	.125	16	.071	.076	5	.2055	6	.2040
JK5514( )08( )( )	1/4	.470	.2495 / .2480	.2656 / 2646	.188	16	.098	.103	17/64	.2656	*	.2646
JK5514( )10( )( )	5/16	.558	.3120 / .3105	.3281 / .3271	.250	16	.109	.114	21/64	.3281	*	.3265
JK5514( )12( )( )	3/8	.688	.3745 / .3730	.3906 / .3896	.312	16	.137	.142	25/64	.3906	*	3890

* SPECIAL DRILL

ACRES FASTENER SLEEVES, J.O. KING, INC., manufactured under one or more of the following U.S. Patents: 3,835,615; 3,835,525; 3,679,109; 3,873,895; 3,805,578; 3,835,688; and foreign patents and patent pending.

PART NUMBER BREAKDOWN

JK5514 (X) (XX) (X) (XX) (X)

- BASIC PART NUMBER — JK5514
- MATERIAL: B = 6061 AL, T6 COND.; C = A286 (PASSIVATED PER QQ-P-35)
- FASTENER SHANK DIAMETER IN 32NDS (ALWAYS 2 DIGITS; SEE TABLE)
- SURFACE FINISH: N = NONE; C = CHEMICAL FILM (PER MIL-C-5541); P = CAD. PLATE, QQ-C-416 CLASS 2, TYPE II
- LENGTH IN 1/16 INCH INDREMENTS (ALWAYS 2 DIGITS) ⚠1
- L = CETYL ALCOHOL LUBRICANT (OPTIONAL); B = NONE

NOTES

⚠1 *Length required created by breakoff at proper groove. See instructions.*

⚠2 *For metal-to-metal to clearance fit of sleeve to hole.*

⚠3 *For light interference to clearance fit of sleeve to hole, stainless only.*

⚠4 *Sleeves 05-55 ungrooved last 3/16", 06-08 ungrooved last 1/4", 10-12 ungrooved last 5/16".*

⚠5 *Tooling for adjusting sleeves to length: Use Step Plate JK65557-XX for sizes 05-55; use Step Plate JK6555-XX for sizes 06-08-10-12, use Breakoff Handle JK6548-XX for all sizes.*

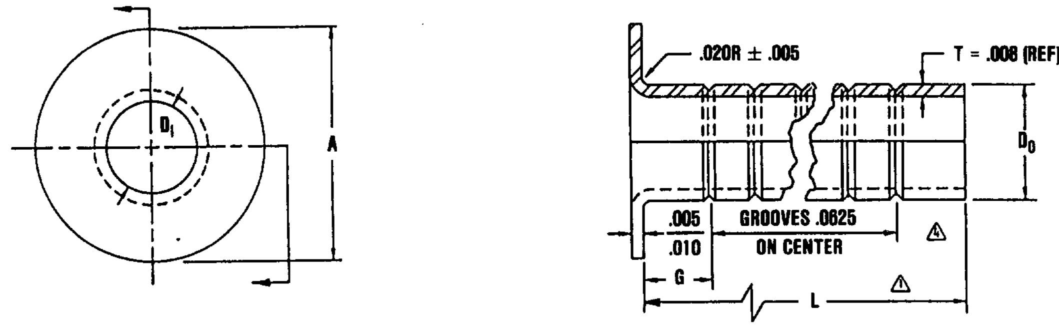
⚠6 *Plating Class 2, Type II, with supplementary chromate treatment-used for identification 1/64 oversize.*

JK5514 SLEEVE — GROOVED, 100°426 FLUSH SHEAR — 1/64 OVERSIZE JK5514

NOTE

This table is not being updated! Obtain manufacturer's tables for current data. J.O. King, Incorporated, 717 Trabert Ave., N.W. Atlanta, Georgia, 30318 (404) 751-1875.

Table 207. Dimensions — Protruding Head Acres Fastener Sleeves



APPROVED CALLOUT	FOR BOLT SIZE (REF)	A DIA. ±.005	D_I DIA.	D_O DIA.	G	L MFG. ⚠1	HOLE PREP. ⚠2 DRILL NO.	HOLE PREP. ⚠2 DRILL DIA.	OPTIONAL HOLE ⚠3 DRILL NO.	OPTIONAL HOLE ⚠3 DRILL DIA.
JK5517( )05( )( )	5/32	.312	.1565 / .1550	.1730 / .1720	.125	12	17	.1730	11/64	.1719
JK5517( )55( )( )	#8	.325	.1635 / .1620	.1800 / .1790	.125	12	15	.1800	*	.1785
JK5517( )06( )( )	#10	.380	.1895 / .1880	.2055 / .2045	.125	16	5	.2055	6	.2040
JK5517( )08( )( )	1/4	.500	.2495 / .2480	.2656 / .2646	.188	16	17/64	.2656	*	.2640
JK5517( )10( )( )	5/16	.620	.3120 / .3105	.3281 / .3271	.250	16	21/64	.3281	*	.3265
JK5517( )12( )( )	3/8	.750	.3745 / .3730	.3906 / .3896	.312	16	25/64	.3906	*	3890

* SPECIAL DRILL

ACRES FASTENER SLEEVES, J.O. KING, INC., manufactured under one or more of the following U.S. Patents: 3,835,615; 3,835,525; 3,679,109; 3,873,895; 3,805,578; 3,835,688; and foreign patents and patent pending.

PART NUMBER BREAKDOWN

JK5517 (X) (XX) (X) (XX) (X)

- BASIC PART NUMBER — JK5517
- MATERIAL: B = 6061 AL, T6 COND.; C = A286 (PASSIVATED PER QQ-P-35) — (X)
- FASTENER SHANK DIAMETER IN 32NDS (ALWAYS 2 DIGITS; SEE TABLE) — (XX)
- SURFACE FINISH: N = NONE; C = CHEMICAL FILM (PER MIL-C-5541); P = CAD. PLATE, QQ-P-416 CLASS 2, TPYE II — (X)
- LENGTH IN 1/16 INCH INCREMENTS (ALWAYS 2 DIGITS) ⚠1 — (XX)
- L = CETYL ALCOHOL LUBRICANT (OPTIONAL); B = NONE — (X)

NOTES

⚠1 *Length required created by breakoff at proper groove. See instructions.*

⚠2 *For metal-to-metal to clearance fit of sleeve to hole.*

⚠3 *For light interference to clearance fit of sleeve to hole, stainless only.*

⚠4 *Sleeves 05-55 ungrooved last 3/16", 06-08 ungrooved last 1/4", 10-12 ungrooved last 5/16".*

⚠5 *Tooling for adjusting sleeves to length: Use Step Plate JK6557-XX for sizes 05-55; use Step Plate JK6555-XX for sizes 06-08-10-12, use Breakoff Handle JK6548-XX for all sizes.*

⚠6 *Plating Class 2, Type II, with supplementary chromate treatment-used for identification 1/64 oversize.*

JK5517 **SLEEVE — GROOVED, PROTRUDING HEAD TENSION TYPE — 1/64 OVERSIZE** JK5517

NOTE

This table is not being updated! Obtain manufacturer's tables for current data.
J.O. King, Incorporated, 717 Trabert Ave., N.W. Atlanta, Georgia, 30318 (404) 751-1875.

Table 208. Kit Numbers — Acres Fastener Sleeves (Sheet 1 of 2)

KITS — ACRES FASTENER SLEEVES
MILITARY KITS FOR MIL-S-85069
KIT NUMBER

M 32 K C __ 05

- M — MILITARY
- 32 — 1/32 OVERSIZE
- K — KIT — IN PLASTIC BOX
- C — SLEEVES ARE A-286
- __ — ADD "P" FOR PLATED SLEEVES (QQ-P-416)
- 05 — SIZE

EACH KIT CONTAINS THE FOLLOWING SLEEVES

Size	Quantity	Sleeves	
SIZE 06	50 Ea.	MIL-S-85069/6 MIL-S-85069/8	MIL-S-85069/7 MIL-S-85069/9
SIZE 08	50 Ea.	MIL-S-85069/6 MIL-S-85069/8	MIL-S-85069/7 MIL-S-85069/9
SIZE 10	30 Ea.	MIL-S-85069/6 MIL-S-85069/8	MIL-S-85069/7 MIL-S-85069/9
SIZE 12	30 Ea.	MIL-S-85069/6 MIL-S-85069/8	MIL-S-85069/7 MIL-S-85069/9

EACH KIT CONTAINS THE FOLLOWING TOOLS

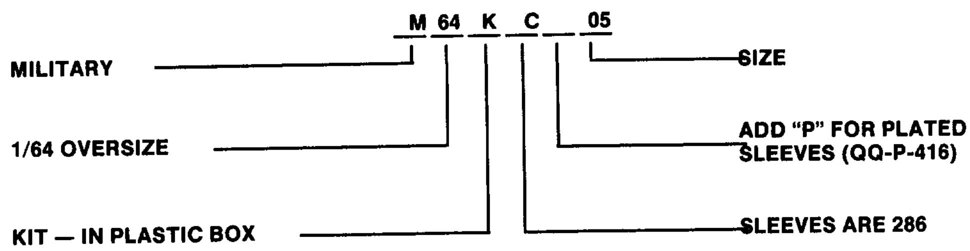
1 Ea. Step Plate JK6556-xx
1 Ea. Break Off Handle JK6546-xx
1 Ea. Sleeve Inserter JK6536-xx
1 Ea. Removing Tool JK6524-xx

FOR THE ABOVE TOOLING IN A PLASTIC BOX WITHOUT SLEEVES,
ADD A "T" ABOVE THE "M" BEFORE THE KIT PART NUMBER

EXAMPLE: MT32KCO5

Table 208. Kit Numbers — Acres Fastener Sleeves (Sheet 2 of 2)

KITS — ACRES FASTENER SLEEVES
MILITARY KITS FOR MIL-S-85069
KIT NUMBER



EACH KIT CONTAINS THE FOLLOWING SLEEVES

SIZE 05	100 Ea.	MIL-S-85069/2 MIL-S-85069/4	MIL-S-85069/3 MIL-S-85069/5
SIZE 55	100 Ea.	MIL-S-85069/2 MIL-S-85069/4	MIL-S-85069/3 MIL-S-85069/5
SIZE 06	100 Ea.	MIL-S-85069/2 MIL-S-85069/4	MIL-S-85069/3 MIL-S-85069/5
SIZE 08	90 Ea.	MIL-S-85069/2 MIL-S-85069/4	MIL-S-85069/3 MIL-S-85069/5
SIZE 10	50 Ea.	MIL-S-85069/2 MIL-S-85069/4	MIL-S-85069/3 MIL-S-85069/5
SIZE 12	30 Ea.	MIL-S-85069/2 MIL-S-85069/4	MIL-S-85069/3 MIL-S-85069/5

EACH KIT CONTAINS THE FOLLOWING TOOLS

1 Ea. Step Plate JK6557 for 05 and 55 Sizes
JK6555 for 06-08-10-12
1 Ea. Break Off Handle JK6548-xx
1 Ea. Sleeve Inserter JK6536-xx
1 Ea. Removing Tool JK6526-xx

FOR THE ABOVE TOOLING IN A PLASTIC BOX WITHOUT SLEEVES, ADD A "T" ABOVE THE "M" BEFORE THE KIT PART NUMBER

EXAMPLE: MT64KCO5

NEW

AERODYNAMIC SMOOTHNESS

STRUCTURAL IDENTIFICATION

GENERAL

Modern airplane specifications require that the airplane exterior surfaces be of extremely smooth construction to obtain design performance. The structural repairman must keep this in mind when making repairs or changes. Figure 101 shows the areas that are most critical aerodynamically; however, smoothness of the entire airplane surface area is a critical requirement from the performance standpoint. The seriousness of this condition is proportional to the airflow disturbance created.

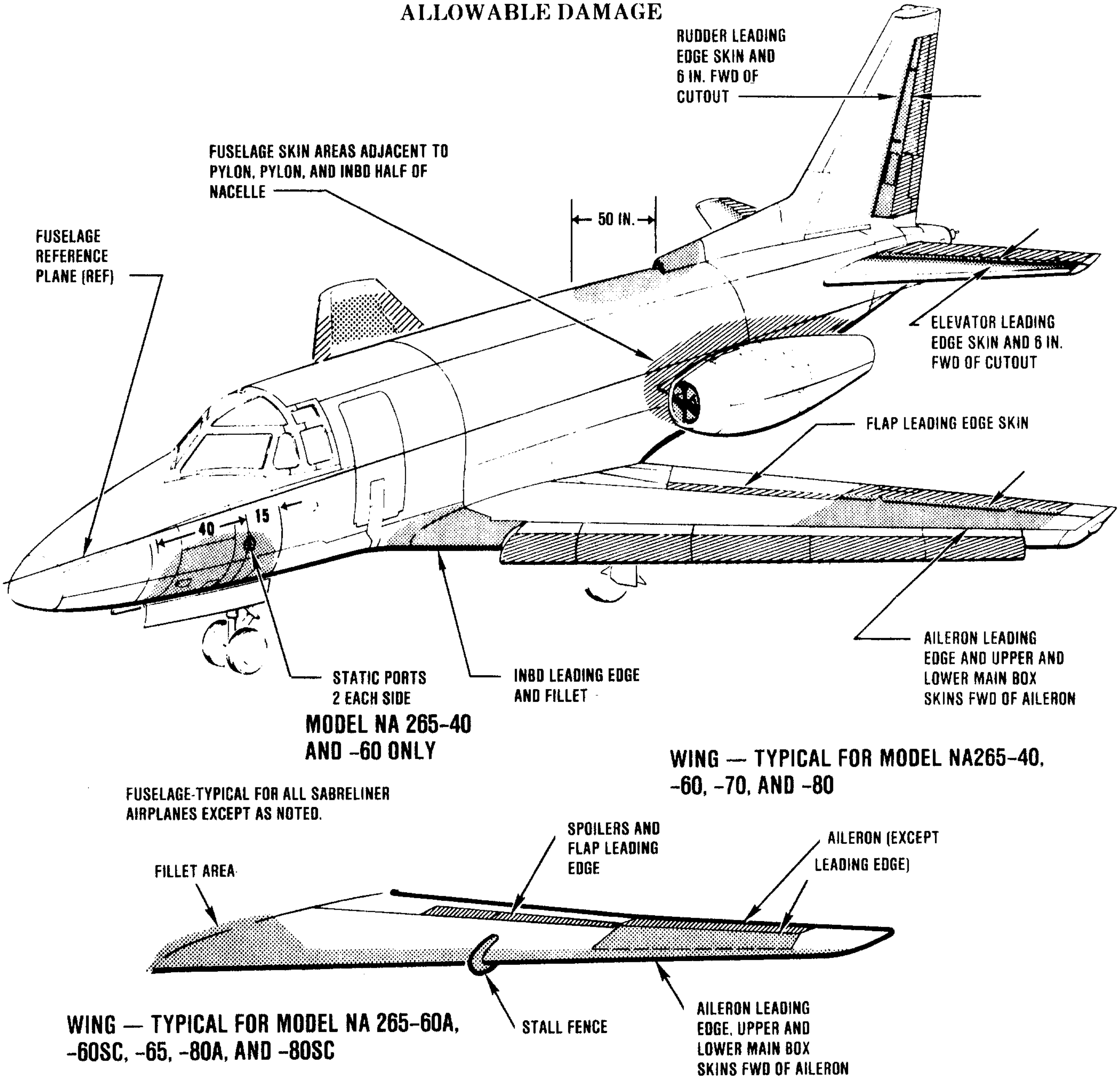
The prime considerations of aerodynamic smoothness are parasite drag (drag caused by skin friction and nonlifting surfaces of an airplane) and the aerodynamic load distribution on the surface. Any repair or change which increases parasite drag will reduce the top speed of the airplane. Also, range will be reduced, since more power, and thus more fuel, is required to maintain cruising speed.

Any change which disturbs the smooth flow of air over a critical surface will change the load on that surface, as well as increase the drag. This effect is greatly increased at transonic speeds because of shock-wave formation in these speed regions. Since, in most cases, a shock wave results in a radical change of the load distribution and an increase in drag, a patch that will cause no difficulty (disturbance) at low speed may become critical when a shock wave is produced by this patch in the transonic speed regions. If this flow change occurs on the wing, a wing-heavy condition proportional to the amount of disturbance will result. If this condition is on the vertical stabilizer, a yawed flight condition will result. These conditions become increasingly serious as control effectiveness drops off at high Mach numbers. Any change in the airflow around the control surfaces is critical, since the control effectiveness, particularly at high Mach numbers, may be affected.

Another problem that may arise at the high speeds is buffeting. Buffeting can be caused by airflow separation around an abrupt change, such as a nonflush patch, in the mold line.

AERODYNAMIC SMOOTHNESS

ALLOWABLE DAMAGE



NOTES

(Dotted pattern) TEMPORARY (NONFLUSH) REPAIRS ARE NOT PERMITTED IN THESE AREAS.

(Hatched pattern) FLIGHT CHARACTERISTICS COULD BE AFFECTED BY TEMPORARY (NONFLUSH) REPAIRS IN THESE AREAS. IF TEMPORARY REPAIRS ARE MADE, A FLIGHT TEST SHOULD BE PERFORMED. IN PERFORMING FLIGHT TEST: (1) CHECK FOR BUFFET UP TO LIMIT SPEED; (2) WITH NONFLUSH REPAIRS ON FLAP LEADING EDGE, CHECK FOR BUFFET WITH FLAPS DOWN AT SPEEDS BELOW 130 KIAS.

Aerodynamically Critical Areas
Figure 101

AERODYNAMIC SMOOTHNESS

REPAIR

GENERAL

Paste-type fillers that cure to a hard-rubber-like consistency are used to fill skin and door gaps, to blend overlapping surfaces, and in other similar conditions to achieve a satisfactory degree of aerodynamic smoothness.

AERODYNAMIC FILLER APPLICATION

Consumables

MATERIAL	SOURCE KEY [A]
Sealing Compound, PR340	002
Sealing Compound, PR341	001
Sealing Compound, PS247	002
Sealing Compound, PS895	002
Methyl Ethyl Ketone, (MEK)	001
Cleaning Compound 5381	014

NOTES

- ***Class B (non-flush) repairs should not be installed on areas designated "critical" in 51-10-60, figure 101.***
- ***Class B repairs provide the structural integrity of Class A repairs, but sacrifice appearance and aerodynamic cleanliness.***

Filler Preparation

Mix according to manufacturer's instructions.

Surface Preparation

1. If surface is painted, remove all paint for a distance of one in. along each side of area to be filled.
2. If surface is not painted, clean area to be filled with MEK.
3. Wipe cleaned area with cleaning compound.
4. Leave cleaner on surface for 2 to 3 minutes.
5. Rinse area with tap water.
6. Allow surface to dry thoroughly.

Filler Appplication

1. Apply filler to gap or form fillet with putty knife or spatula.
2. Smooth out filler, leaving bead or fillet slightly overfull to allow for sanding when cured.
3. Cure filler for 24 hours and sand to blend with surrounding areas.

NOTE

Cure time may be accelerated with heat lamps. Do not heat over 160°F.

4. Sand smooth and clean area with MEK.
5. Refinish to match surrounding area.

[A] Refer to 51-30-00 Table 2 for manufacturer.

PROCESSES

STRUCTURAL IDENTIFICAION

GENERAL

Information pertaining to special processes used in the repair of Sabreliner airplanes are contained in this section. General engineering practices are not included; however, deviations from general engineering practices are provided. Unique repair procedures are incorporated in the repair information and only referenced in this section.

FUSELAGE AND NACELLE SEALING

STRUCTURAL IDENTIFICATION

GENERAL

Fuselage and nacelle sealing is accomplished with hardening sealing compounds, pressure-sensitive tapes, and inflatable rubber and noninflatable rubber seals.

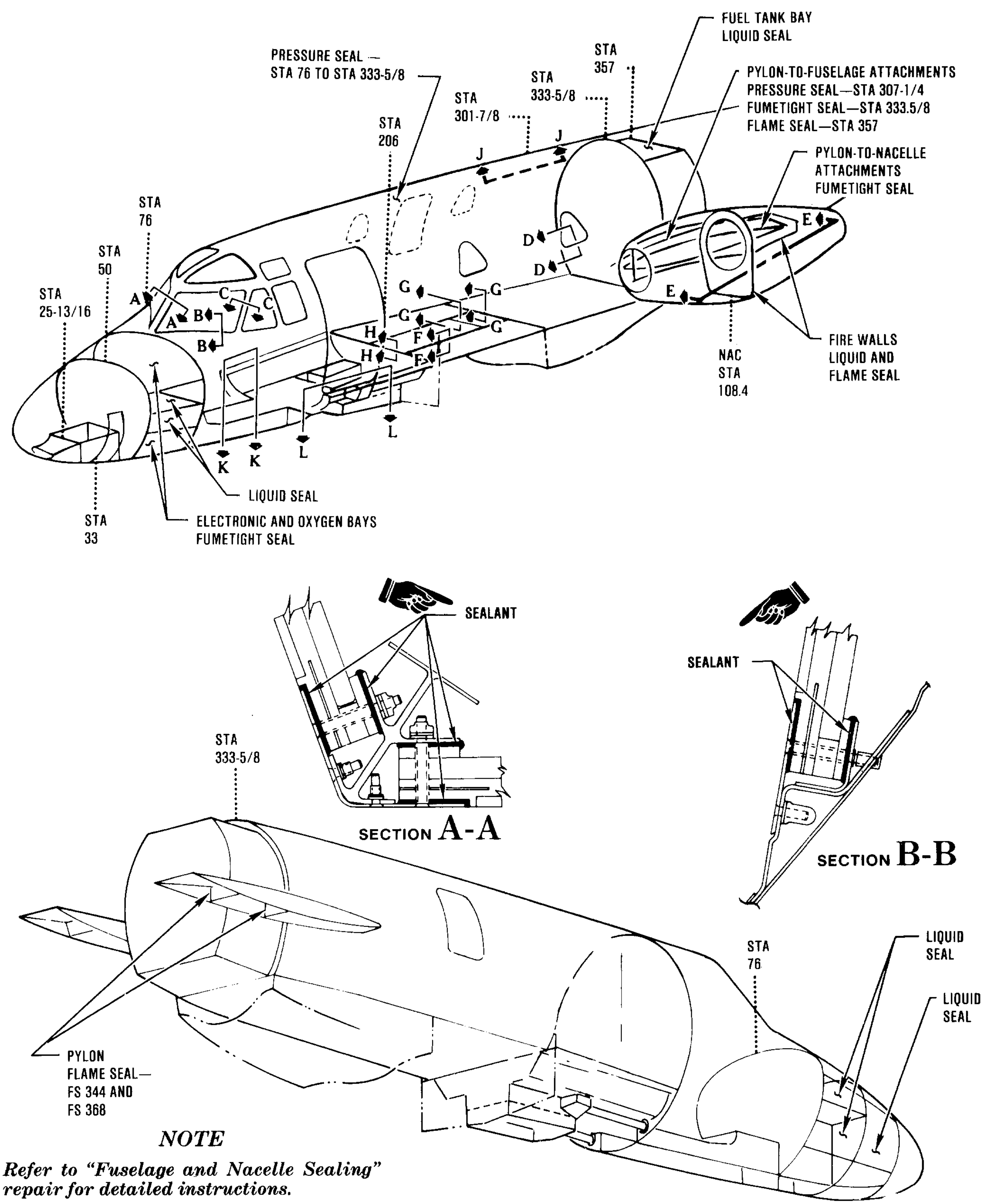
Sealing compounds may be spread with spatulas or knives or injected with hand-operated or pneumatically operated guns. For a diagram of fuselage and nacelle sealed areas, see figure 1 for Model NA 265-40, -60, -60A, and -60SC and figure 2 for Model NA 265-70, -80, -80A, and -80SC.

CLEANING

To obtain a satisfactory seal, the area to be sealed must be thoroughly cleaned before the application of the sealing compound. With a vacuum cleaner or by wiping with a clean, dry cloth, remove all dust and foreign matter from the area to be sealed. With a clean cloth saturated with methyl ethyl ketone (MEK) or its equivalent, wipe the area to be sealed. Before the MEK has evaporated completely, dry the surface with a clean cloth. Repeat this cleaning procedure until it is certain that no oil, grease, or other contaminating substances are left on the surface to be sealed. It is important that only clean cloths be used. When a cloth becomes soiled, it should be discarded. To avoid contaminating the solvent, the solvent should always be poured from the container onto the cloth; never dip the cloth into the container of solvent. If the sealing compound is to be applied to surfaces that have been primed, check the primed surface for lack of adhesion by scratching the surface with the thumbnail. If the primer is easily removed, its adhesion is considered unsatisfactory, and will necessitate removal of the primer before the sealing compound is applied.

SEALANT MIXING

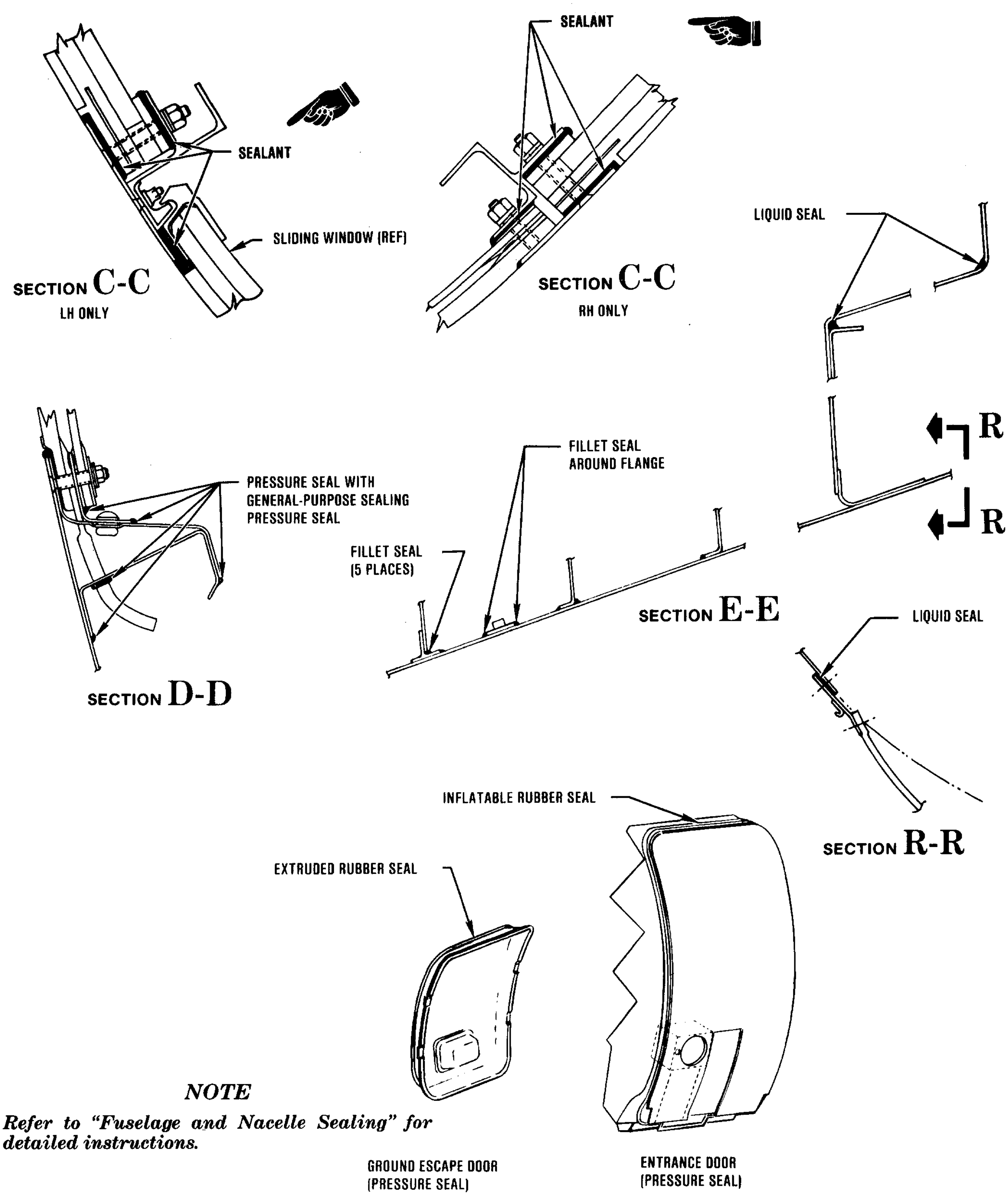
Mix the base compound and the accelerator together in the proportions recommended by the manufactures. The two components must be thoroughly mixed to completely disperse the accelerator throughout the base compound. If the mixture is not thoroughly blended there will be areas where the cure will be incomplete. At room temperature (approx. 77°F) the blended sealant has a pot life of three hours. Any sealant that has been exposed to the atmosphere for a period of over three hours must be discarded. The blended sealant may be stored at 0 to -10°F for a period not to exceed 72 hours providing the sealant is refrigerated immediately after blending.



NOTE

Refer to "Fuselage and Nacelle Sealing" repair for detailed instructions.

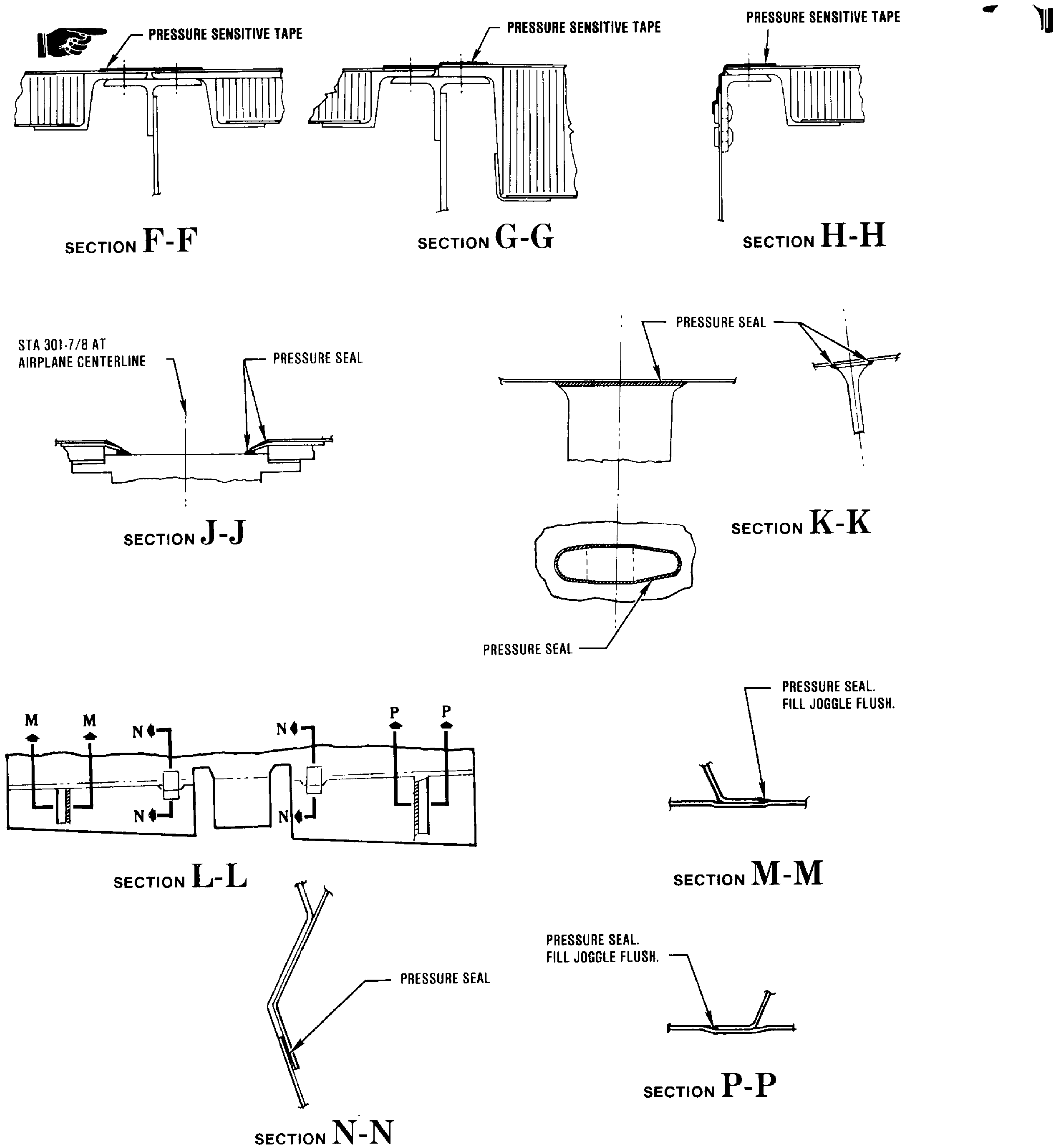
Fuselage and Nacelle Sealing Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1 (Sheet 1 of 3)



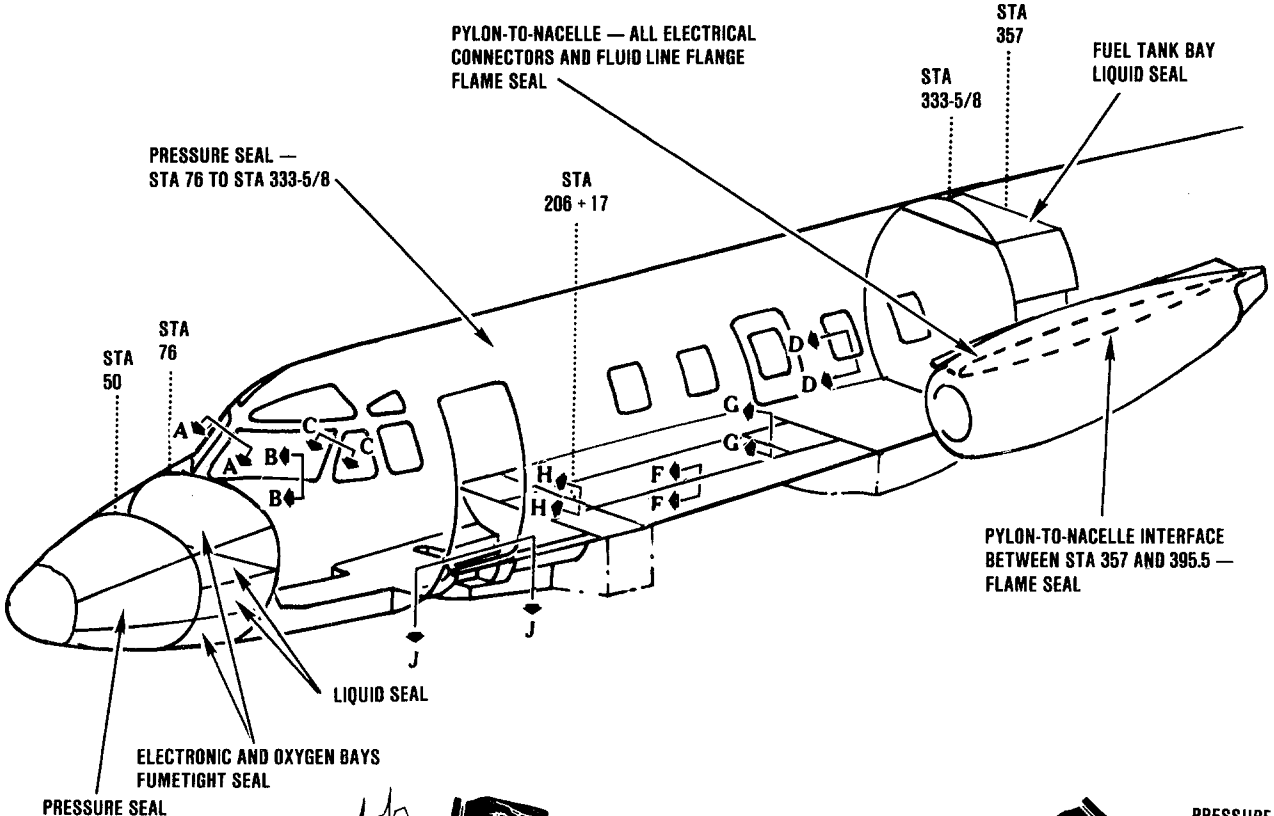
NOTE

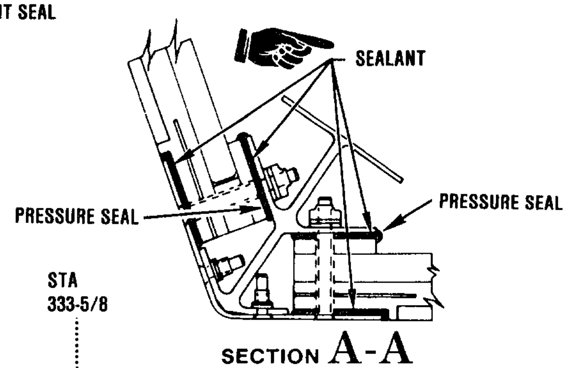
Refer to "Fuselage and Nacelle Sealing" for detailed instructions.

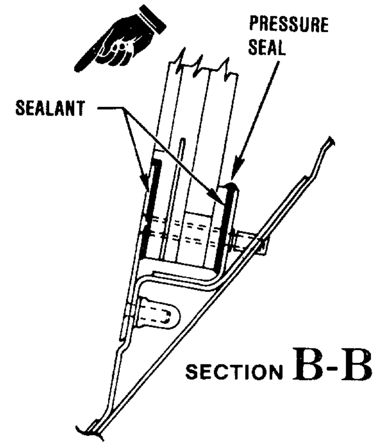
Fuselage and Nacelle Sealing Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1 (Sheet 2 of 3)

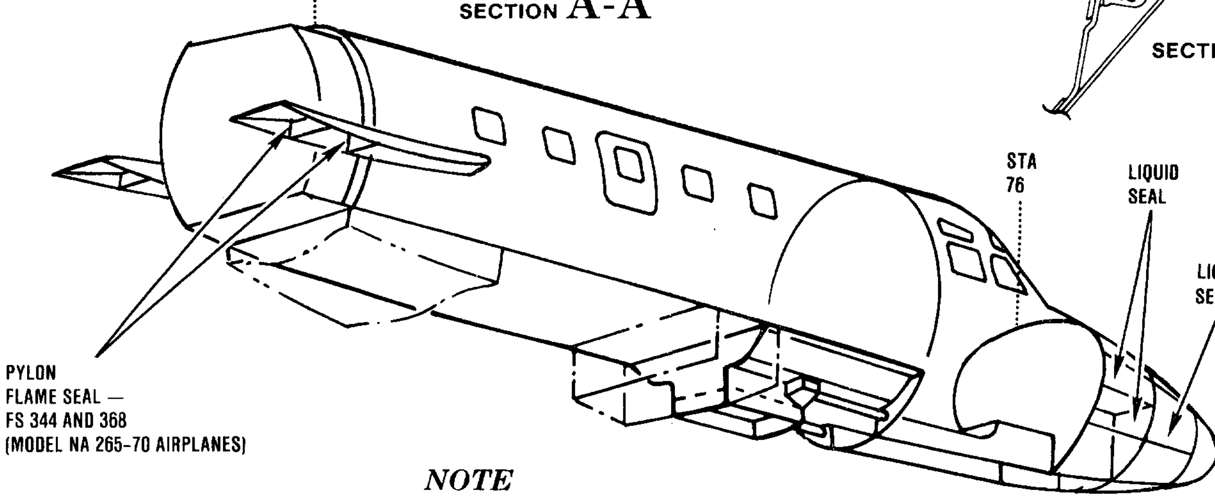


Fuselage and Nacelle Sealing Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1 (Sheet 3 of 3)





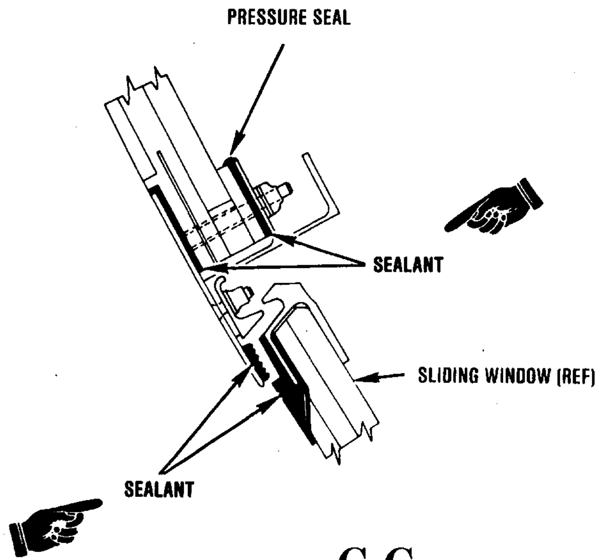




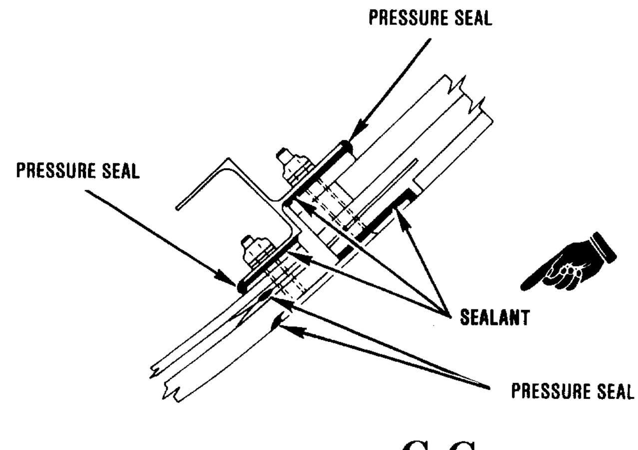
NOTE

Refer to "Fuselage and Nacelle Sealing" repair for detailed instructions.

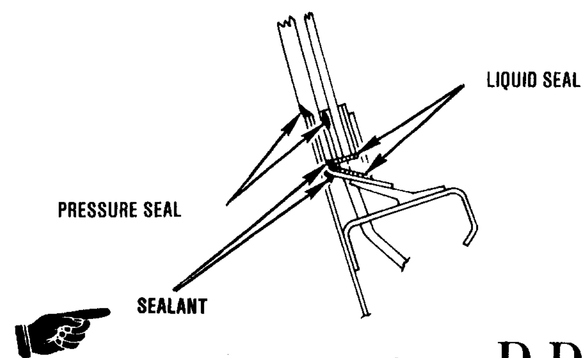
Fuselage and Nacelle Sealing Model NA 265-70, -80, -80A, and -80SC
Figure 2 (Sheet 1 of 3)



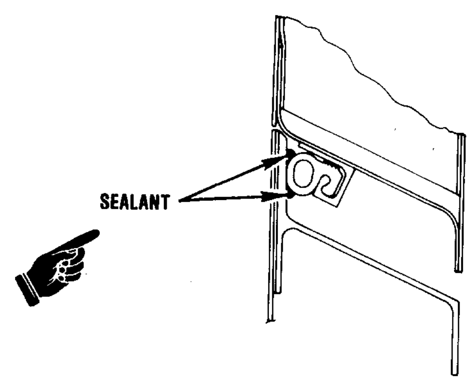
SECTION C-C
LH ONLY



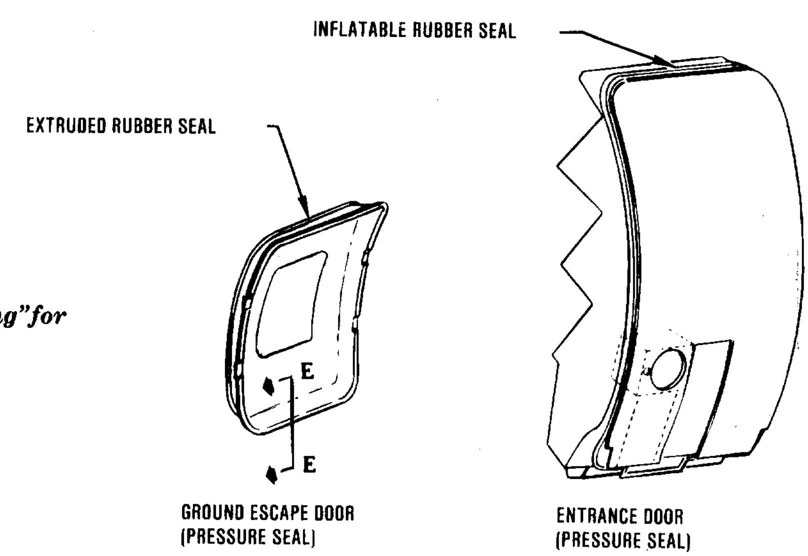
SECTION C-C
RH ONLY



SECTION D-D



SECTION E-E

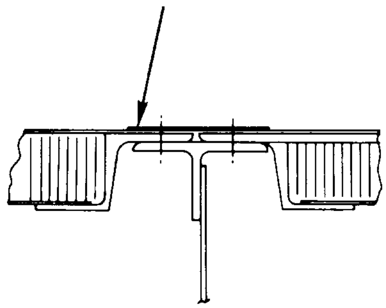


NOTE

Refer to "Fuselage and Nacelle Sealing" for detailed instructions.

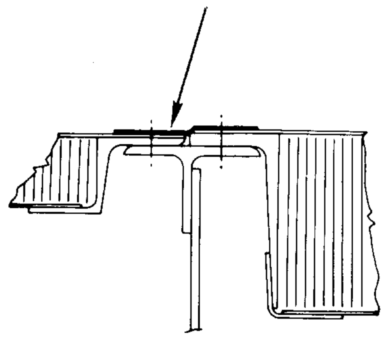
Fuselage and Nacelle Sealing Model NA 265-70, -80, -80A, and -80SC
Figure 2 (Sheet 2 of 3)

PRESSURE SENSITIVE TAPE 2 IN. WIDE BY 0.010 IN. THICK. COVER GAP AND FASTENER HEADS.



SECTION F-F

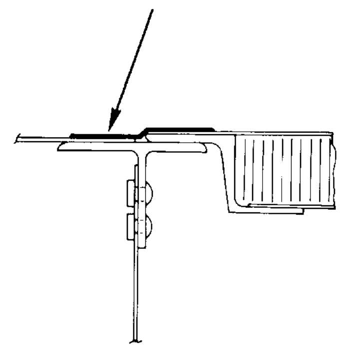
PRESSURE SENSITIVE TAPE 2 IN. WIDE BY 0.010 IN. THICK. COVER GAP AND FASTENER HEADS.



SECTION G-G

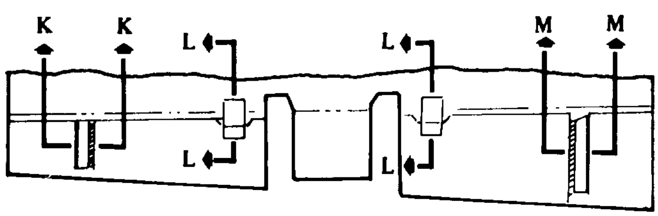
(TYPICAL AT FS 247 AND 264.25)

PRESSURE SENSITIVE TAPE 2 IN. WIDE BY 0.010 IN. THICK. COVER GAP AND FASTENER HEADS.



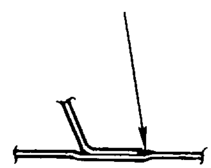
SECTION H-H

(FS 206 + 17)

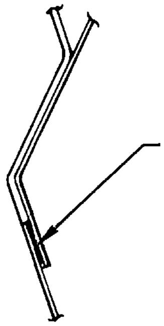


SECTION J-J

PRESSURE SEAL.
FILL JOGGLE FLUSH



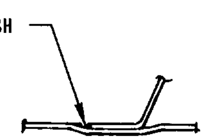
SECTION K-K



PRESSURE SEAL

SECTION L-L

PRESSURE SEAL.
FILL JOGGLE FLUSH

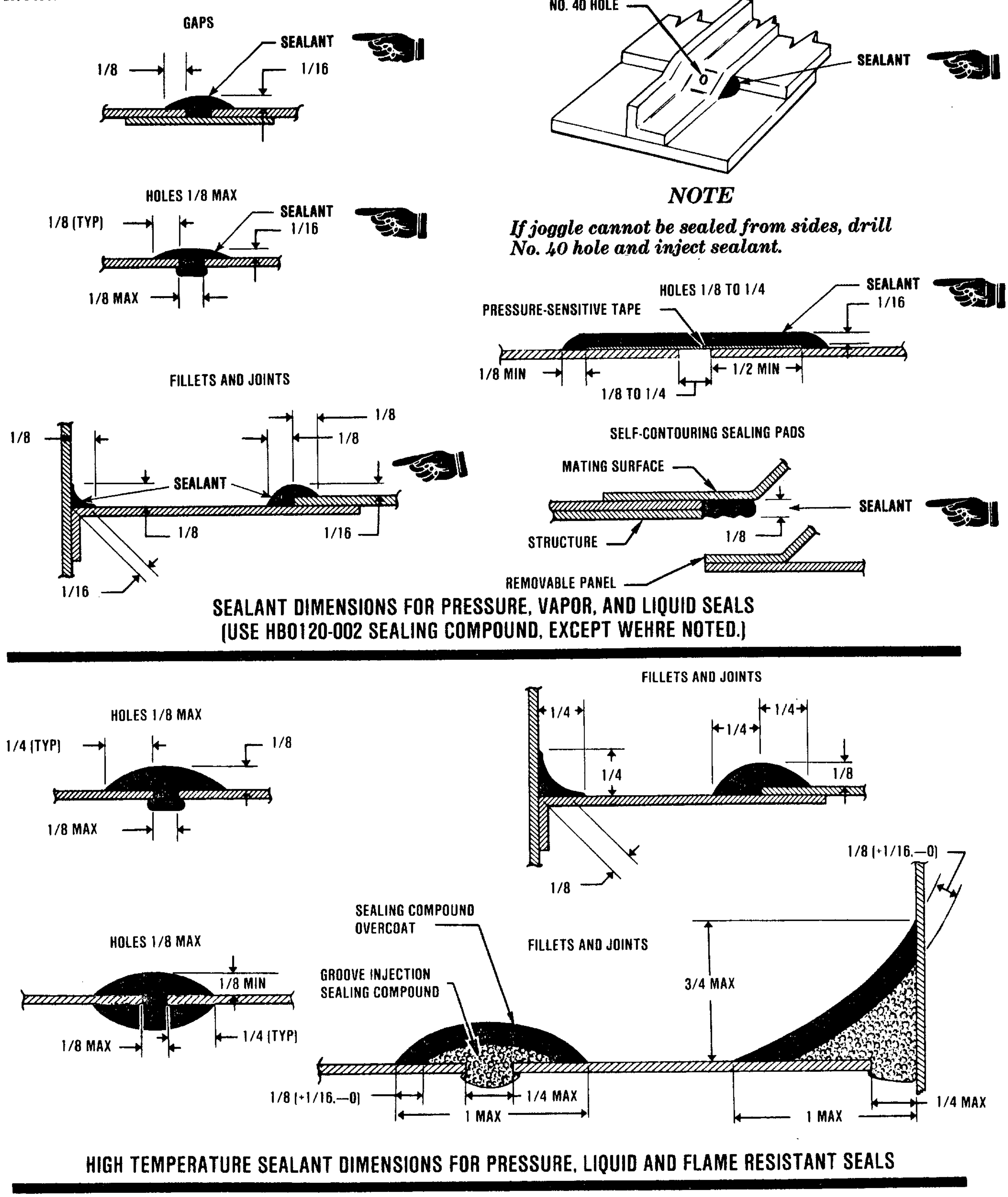


SECTION M-M

Fuselage and Nacelle Sealing Model NA 265-70, -80, -80A, and -80SC
Figure 2 (Sheet 3 of 3)

NOTE

Unless otherwise noted, all dimensions are shown in inches.



Typical Sealant Applications and Dimensions
Figure 3

FUSELAGE AND NACELLE SEALING

REPAIR

GENERAL

The following procedure provides the materials and processes for the airtight sealing of all joggles, seams, butt and lap joints, holes, slots, and fasteners in the pressurized area where the normal operating temperatures are between -65°F and +225°F.

The fuselage structure and all seals in the pressurized area are designed to withstand a maximum pressure differential of 18.4 psi. A maximum allowable leakage of 144 cubic feet per minute at 8.81 psi may exist before repairs or resealing procedures are necessary.

PRESSURETIGHT AND LIQUIDTIGHT SEALING

Consumables

MATERIAL	SOURCE KEY [A]
For Sealant Type, refer to 51-30-00 Table 2A.	
Sealant Gun, Model 250 (or equivalent)	043
Pressure Sensitive Tape	001
Methyl Ethyl Ketone (MEK) (or equivalent)	001

Procedures

1. Clean surface and surrounding area. (Refer to Cleaning, 51-20-10.)
2. Mix sealant. (Refer to Sealant Mixing, 51-20-10.)
3. Apply sealing compound as follows (see figure 3):
   A. Joggles
      (1) Seal all joggles before joints or seams.
      (2) Completely fill joggles with sealant.
      (3) Force sealant under joggle from either or both sides of the joggle.
      (4) If the joggle cannot be force-filled, drill a No. 40 (0.098) hole in the center of the joggle run out.
      (5) Inject sealant through hole to seal joggle.

   B. Holes and Slots Up To 1/8-In. Width
      (1) Fill hole or slot with sealant.
      (2) Build up a bead to a minimum thickness of 1/16 in. and a width or diameter of 3/8 in.

   C. Holes 1/8 To 1/4-In. Diameter
      (1) Apply a layer of pressure sensitive tape over hole.

NOTE

The tape should extend at least 1/2 in. beyond the hole in all directions.

      (2) Cover tape with a layer of sealant 1/8 in. thick.
      (3) Extend sealant 1/8 in. beyond tape edge in all directions.

   D. Holes Greater Than 1/4-In. Diameter
      (1) Fill or plug hole with a rivet or balsa wood.
      (2) Apply a minimum of 1/16 in. layer of sealing compound.
      (3) Extend sealant 1/8 in. beyond the edges of the hole.
      (4) Before sealing, close out oversized slots or joggles.

NOTE

Do not drill holes in chem-milled areas to fasten fillers in place.

      (5) Secure filler in position, using existing fasteners.

   E. Riveted Butt and Lap Seams
      (1) Seal seams and riveted joints with pressure gun.

NOTE

A bead of sealing compound should be continuous and even. The final bead dimension should conform to the dimensions shown in figure 3.

[A] Refer to 51-30-00 Table 2 for manufacturer.

REPAIR (Continued)

PRESSURETIGHT AND LIQUIDTIGHT SEALING (Cont'd)

Procedures (Cont'd)

(2) Apply a continuous bead of sealing compound to seams and joints.

(3) Seal rivets and bolts, when necessary, by brushing a coat of EC776R sealing compound on all rivets and bolts in the pressurized area.

NOTES

- ***Excess sealing compound should be removed within three hours after exposure to room temperature.***
- ***Naphtha, toluol or MEK should be used as a cleaning material.***

(4) Clean excess sealant from pressurized area and sealing equipment.

FUMETIGHT SEALING
(Areas Operating Between -65° and +225°F)

The following procedure is applicable to the sealing of joggles, cutouts, holes, slots and hat sections in areas where excessive leakage of air, fumes, and smoke could prove dangerous.

Consumables

MATERIAL	SOURCE KEY A
For Sealant Type, refer to 51-30-00 Table 2A.	
Pressure Sensitive Tape	001
Sealant Gun, Model 250 or equivalent	043
Methyl Ethyl Ketone (MEK) (or equivalent)	001

Procedures

NOTE

Sealing compounds are dependent upon the operting temperatures of the area being sealed.

1. Clean surface and surrounding area. (Refer to CLEANING.)
2. Mix sealant. (Refer to SEALANT MIXING.)
3. Apply sealing compound as follows (see Figure 3):

NOTE

Sealant may be applied to either bare or painted surfaces as applicable.

A. Procedures for sealant application are identical to those outlined in PRESSURETIGHT AND LIQUIDTIGHT SEALING with the additional information contained in step B.

B. In addition to the procedures for holes 1/8 to 1/4 Inch Diameter a second method is offered — Groove Injection Sealing Compound Coated with General Purpose Sealing Compound.

NOTES

- ***This method should be used only when the pressure sensitive tape method cannot be used.***
- ***Groove injection sealing compound may be softened for easier application by warming or working with hands. Make certain hands are free of grease and oil.***

(1) Fill the hole or slot on the pressure side of the area with groove injection sealing compound.

(2) Form a fillet or bead extending 1/4 in. beyond edges of hole or slot in all directions.

(3) Apply 1/8 in. thick coating of general purpose sealing compound over the groove injection sealing compound. (See figure 3.)

FUMETIGHT SEALING
(Areas Operating Between 250° and 400°F)

The following procedure is applicable to the sealing of joggles, cutouts, holes, slots, and hat sections where excessive leakage of air or fumes must be avoided, where pressure differentials do not exceed 5 psi and where the operating temperatures extend from 250 to 400°F and where peak temperatures do not exceed 500°F.

Consumables

MATERIAL	SOURCE KEY A
For Sealant Type, refer to 51-30-00 Table 2A.	
Sealant Gun, Model 250 (or equivalent)	043
Methyl Ethyl Ketone (MEK) (or equivalent)	001

A Refer to 51-30-00 Table 2 for manufacturer.

REPAIR (Continued)

FUMETIGHT SEALING (Cont'd)

Procedures

1. Clean surface and surrounding area. (Refer to Cleaning.)
2. Sealant preparation:

NOTES

- ***Sealant is ready for use as is.***
- ***Do not allow sealant container to remain open any longer than necessary. The solvent evaporates very rapidly.***
- ***Sealant may be thinned with MEK if it becomes thick.***
- ***Do not thin sealant beyond its original consistency.***

3. Apply sealant as follows:

CAUTION

Apply sealant only in a well ventilated area or use air supply respirators.

A. Locate areas to be sealed.

NOTE

Shine a light on one side of the surface to be sealed and inspect the opposite side for light passage.

B. Procedures for sealant application are identical to those outlined in Pressuretight and Liquidtight Sealing.

FLAME RESISTANT AND LIQUIDTIGHT SEALING

This procedure outlines the procedures and materials used to seal joggles, holes, cut-outs, etc. in areas where leakage of fluids must be avoided and where a flametight seal is necessary in case of fire. The sealing methods provided are applicable to areas where the temperature may be as high as 400°F during normal operation and with occasional temperature increases to 500°F for short periods of time.

Consumables

MATERIALS	SOURCE KEY [A]
For Sealant Type, refer to 51-30-00 Table 2A.	
Sealant Gun, Model 250 (or equivalent)	043
Methyl Ethyl Ketone (MEK) (or equivalent)	001

[A] Refer to 51-30-00 Table 2 for manufacturer.

Procedures

1. Clean surface and surrounding area. (Refer to Cleaning.)
2. Apply sealant as follows (see figure 3):

A. Holes, Slots, and Gaps Less Than 1/8 In.

(1) Seal all holes, slots and gaps less than 1/8 in. in diameter or width with PR810 high temperature sealing compound from both sides of the bulkhead, web, or firewall.

(2) Obtain a bead or button of sealant as indicated in figure 3.

(3) If only one side of the area to be sealed is accessible, seal the hole or gap by forcing an excessive amount of sealant through the hole to form a button or grommet of sealant on the inaccessible side of the area being sealed.

B. Holes or Slots Greater Than One In.

(1) Holes or slots greater than one in. in diameter or width must first be plugged or filled with metal clips or snap-in plugs.

(2) Apply sealant at least 1/8 in. thick over the plugged hole or gap and extend at least 1/4 in. beyond the edge of the plug.

(3) Ensure there are no gaps or bridges in the sealant.

C. Seams and Riveted Joints

(1) Seal seams and riveted joints with PR810 high temperature sealing compound.

(2) Apply sealant using a sealant gun.

(3) Apply 1/8 in. thick bead of sealant with 1/4 in. minimum overlap on each side of seam being sealed.

NOTES

- ***When a fillet of PR810 sealing compound is required, the fillet legs must be at least 1/4 in. in length as shown in figure 3.***
- ***If a stiffener crosses the seam being sealed, the joggle or gap must be injected with sealant, then both sides of the stiffener must be sealed for a minimum distance of 6 in. from the seam, or the entire length of the stiffner, whichever is shorter.***

(4) Apply sealant with a spatula over rivets securing seam.

REPAIR (Continued)

FLAME RESISTANT AND LIQUIDTIGHT SEALING (Cont'd)

Procedures (Cont'd)

(5) Sealant should extend 1/8 in. beyond edge of rivet in all directions.

D. Clean excess sealant from area with clean cloth and MEK.

REMOVABLE DOORS SEALING

The following procedures are used to provide synthetic rubber self-contouring sealing pads to the stationary structure located under removable doors or panels, and between normally separable sections of the structure where the operating temperatures range from -65° to +225°F.

Consumables

MATERIAL	SOURCE KEY [A]
For Sealant Type, refer to 51-30-00 Table 2A.	
Petrolatum, Technical Grade	001
Pressure Sensitive Tape	001
Methyl Ethyl Ketone (MEK) (or equivalent)	001
Sealant Gun, Model 250 (or equivalent)	043

Procedures

1. Clean surface and surrounding area. (Refer to CLEANING, 51-20-10.)
2. Mix sealant. (Refer to SEALANT MIXING.)
3. Apply sealing compound as follows (see figure 3):

A. Apply sealant using a sealant gun or wooden spatula.

B. If sealant gun is used, smooth out sealant bead with wooden spatula to a 1/8 in. uniform thickness.

C. Ensure that sufficient sealant has been applied to fill all gaps and voids.

D. Apply petrolatum to all portions of removable parts of the assembly that will come in contact with sealing compound (i.e., panels, screws, quick-disconnects, etc.).

E. Assemble parts being sealed.

F. Allow a minimum of eight hours cure time or until compound is cured.

G. After sealant has cured, disassemble parts, trim excess sealing compound, wipe petrolatum from surfaces with a clean, dry cloth, and wash screws, quick-disconnects, etc. with MEK or equivalent.

FAYING SURFACE SEALING

The following procedure should be used to provide a satisfactory faying surface seal between mating surfaces of the airplane structure. This procedure is applicable to areas of the airplane which operate in the temperature range of -65° to +225°F.

Consumables

MATERIAL	SOURCE KEY [A]
For Sealant Type, refer to 51-30-00 Table 2A.	
Sealant Gun, Model 250 (or equivalent)	043
Methyl Ethyl Ketone (MEK) (or equivalent)	001

Procedures

1. Clean surface and surrounding area. (Refer to CLEANING.)
2. Mix sealant. (Refer to SEALANT MIXING.)
3. Apply sealing compound as follows:

A. Apply sealant with a sealant gun or wooden spatula.

B. If sealant gun is used, smooth out sealant bead with wooden spatula to a 1/32 in. uniform thickness to both faying surfaces.

C. Join faying surfaces as soon as possible after sealant application.

D. Secure faying surfaces with applicable fasteners.

8E. Clean excess sealant from faying surfaces and equipment with clean cloth and MEK.

[A] Refer to 51-30-00 Table 2 for manufacturer.

REPAIR (Continued)

EXTERIOR WATERTIGHT SEALING

The following procedure is applicable to the sealing of the exterior surfaces of the airplane where normal operating temperatures do not exceed 225°F.

Consumables

MATERIALS	SOURCE KEY A
For Sealant Type, refer to 51-30-00 Table 2A.	
Methyl Ethyl Ketone (MEK) (or equivalent)	001
Pressure Sensitive Tape	001
or	
Sealant Gun, Model 250 (or equivalent)	043

Procedures

1. Remove all paint and primer (except epoxy polyamide primer) using a stiff bristle brush and MEK.
2. Remove paint and primer a distance of 1/2 in. in all directions from the gap being sealed.

NOTE

Sealants may be applied to a clean epoxy polyamide primed surface without adverse effects.

3. Clean surface and surrounding area. (Refer to CLEANING.)
4. Apply sealing compound as follows:

NOTE

Do not use fingers to press the masking tape in place or allow fingers to touch the cleaned surface. Oil from the fingers will contaminate the cleaned surface and necessitate that the surface be re-cleaned.

A. Apply a 3/4 to 1 in. wide strip of masking tape to the skin on each side of the skin gap being sealed, leaving 1/16 ±1/32 in. of skin exposed on each side of the skin gap.

B. Apply the sealant by using either the sealant gun or a clean wooden spatula.

C. If the sealant gun is used, place the opening of the tip flat against the seam and apply a slight excess of compound, moving the gun as the joint fills up.

D. If a spatula is used, apply an excess of sealant at one point of the seam and work the sealant into and along the seam.

E. After the compound has been applied using the sealant gun, use a spatula and press the compound into the seam, removing the excess from the sealed area.

F. If a spatula was used to apply the sealant, remove the excess compound with the spatula.

NOTE

It is essential that the tape be removed before the compound sets up.

G. Remove tape after the seam is sealed and the excess compound is removed.

NOTES

- ***Moistening the finger with water will minimize sticking of the compound to the finger.***
- ***Do not use soap on the fingers as this may impair adhesion of the compound to the structure.***

H. Immediately after removing the tape, feather the edges of the compound. This may be done by drawing one finger along the edge.

I. Allow the compound to cure a minimum of 24 hours at room temperature before covering or disturbing the surface.

J. Clean up excess sealing compound and the sealant gun using MEK or equivalent.

A Refer to 51-30-00 Table 2 for manufacturer.

ADHESIVE BONDING

REPAIR

GENERAL

The bonding process described in the following paragraphs may be used structurally when specific repair instructions so direct.

ALUMINUM ALLOY SURFACE PREPARATION

The strength of bonded joints depends largely on the proper preparation and *cleanness* of the surfaces to be bonded. To ensure adequate adhesion, the procedures given must be followed *exactly*. Cleaned surfaces should be handled with *clean* white gloves and protected in all ways from contamination. Whenever there is any doubt as to the cleanness of a part, the cleaning procedure must be repeated before the bonding material is applied.

Consumables

MATERIAL	SOURCE KEY A
Acetone or Methyl Ethyl Ketone (MEK)	001
Paint Remover, Striprite 103	045
Epoxy Stripper, A202	016
Toluene	001
Sulfuric Acid, Specific Gravity 1.84 Grade	001
Sodium Dichromate, Technical Grade	001
Talc, White Powder, Technical Grade	001
Sandpaper, 320 Grit, Wet or Dry	001
Glass Wool	001
Cellulose Tissues (or equivalent)	044

A Refer to 51-30-00 table 2 for manufacturer.

NOTE

Certain specific safety precautions are noted in the following procedures. In addition, all normal safety precautions should be observed in the handling and storing of flammable and toxic materials.

Honeycomb Sandwich Panel Cleaning Procedures

1. Evaluate damage.
2. Fabricate repair doublers.
3. Strip, clean, and etch damaged and repair parts.

NOTE

All possible care must be taken in performing cutting and drilling operations after cleaning to prevent contamination of the cleaned and etched surfaces.

4. Trim out damage and remove necessary rivets.
5. Trial fit honeycomb repair plugs.

NOTE

Do not allow cleaning agent to run into honeycomb core.

6. Clean honeycomb panels and repair plugs with MEK or equivalent prior to bonding.
7. Wipe surface dry.
8. Repeat steps 6 and 7 as required until repair area is thoroughly clean.
9. Clean the face sheets and repair doublers.
10. Clean and etch repairs other than honeycomb sandwich panel after all trimming, fitting, and drilling operations.

Sheet-Metal Surface Cleaning Procedures

NOTES

- ***Use only clean MEK in clean cans.***
- ***Do not contaminate MEK by dipping soiled clothing into container.***
- ***Use clean lint-free cloth.***

1. Remove all paint.
2. Apply MEK to bonding surface by either of the following:
   A. Pour MEK onto clean lint-free cloth and wipe surface.
   B. Pour MEK onto surface.
3. Remove dirt, grease, and other surface contaminants from unpainted surfaces.
4. Wipe surface dry with clean lint-free cloth. Do not allow MEK to air dry on surface.
5. Lightly sand bonding surface with clean, 320-grit sandpaper and wipe off loose particles with clean lint-free cloth.

REPAIR (Continued)

Sheet Metal Surface Cleaning Procedures (Cont'd)

WARNING

- ***To avoid possible explosion, sulfuric acid must be added to water, never the reverse. Excessive heat buildup can result if sulfuric acid is added too quickly to water.***
- ***Use rubber gloves and adequate eye protection when handling acid cleaner.***

6. Mix sulfuric acid cleaner to the following specification:

Sulfuric acid, specific gravity 1.84	55 parts by weight
Sodium dichromate	10 parts by weight
Water	80 parts by weight

NOTES

- ***A clean glass, rubber, or suitable plastic container must be used for holding ingredients for mixing and using.***
- ***Sulfuric acid solution should be 70°F minimum.***
- ***When applying acid cleaner to vertical surfaces or areas near cracks or holes, add sufficient talc to cleaner to form a thick paste that will not run or sag. Do not permit cleaner to run into areas that cannot be flushed with water.***
- ***Sodium dichromate should be added to acid-water mix.***

7. Stir acid cleaner thoroughly to mix ingredients. Use a glass, plastic, or rubber rod or paddle for stirring.
8. Apply acid cleaner to bonding surface by either immersing or swabbing with glass wool.
9. Allow acid cleaner to stand on surface for 20 to 30 minutes.
10. Rinse surface thoroughly with water.
11. Check surface for water-break-free surface.
12. If water on surface tends to form drops, repeat cleaning and rinsing procedure until a water-break-free surface is obtained.
13. Dry surfaces thoroughly. Do not heat over 150°F.

Honeycomb Core Cleaning Procedures

1. Trim out damaged core area with clean, oil-free tools.
2. Clean area to remove dust and metal chips with either a vacuum cleaner or by blowing with water- and oil-free air.
3. After final shaping and fitting, vapor-degrease the honeycomb repair plug if possible, or rinse it in MEK or equivalent.

STRUCTURAL METAL-TO-METAL BONDING

Consumables

MATERIAL	SOURCE KEY A
EA 934 NA	058
Sealing Compound, Buna-N type, EC776 or EC776R	005
Epoxy Stripper, A-202	016
Acetone	001

A Refer to 51-30-00 table 2 for manufacturer.

NOTE

Certain specific safety precautions are noted in the following procedures. In addition, all normal safety precautions should be observed in handling and storing flammable and toxic materials.

Procedures

1. Clean all surfaces to be bonded.
2. Mix adhesive per manufacturers recommendation.
3. Apply adhesive with either a spatula, putty knife, glue spreader, or other suitable means.

NOTE

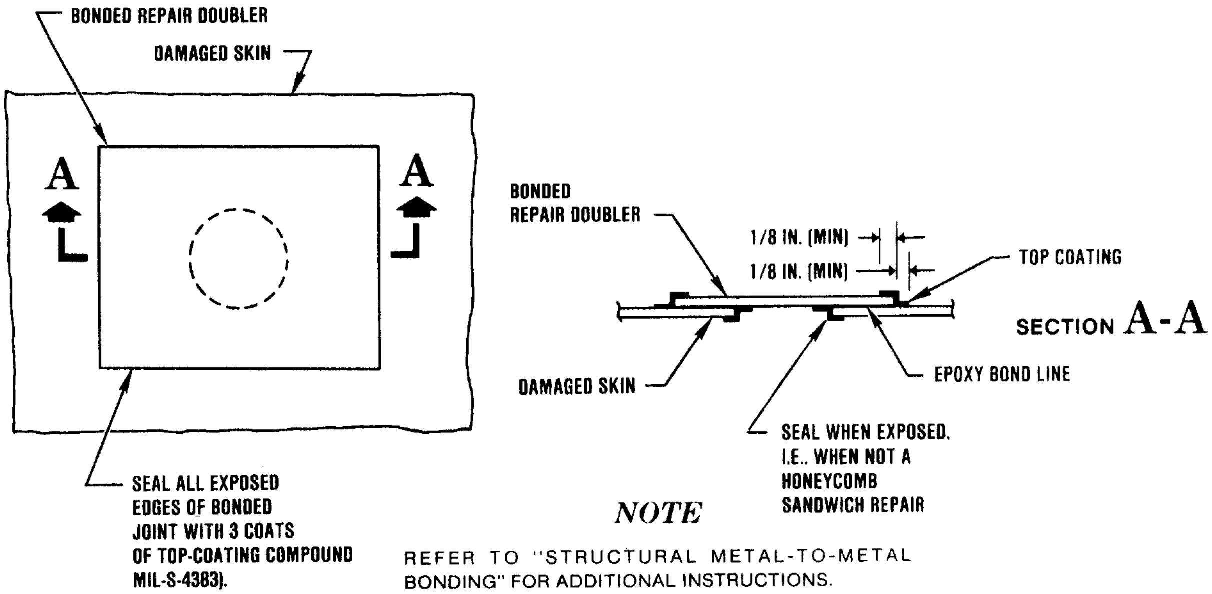
Adhesive should be applied to both bonding surfaces when possible.

4. Spread adhesive evenly and thickly enough to fill any voids. (See figure 201).
5. Clamp bonding surfaces together as soon as possible to avoid contamination and before adhesive begins set-up.

NOTE

Contact pressure is adequate for a good bond. Additional pressure may be applied if bond is not starved through excessive squeeze-out or damage to parts.

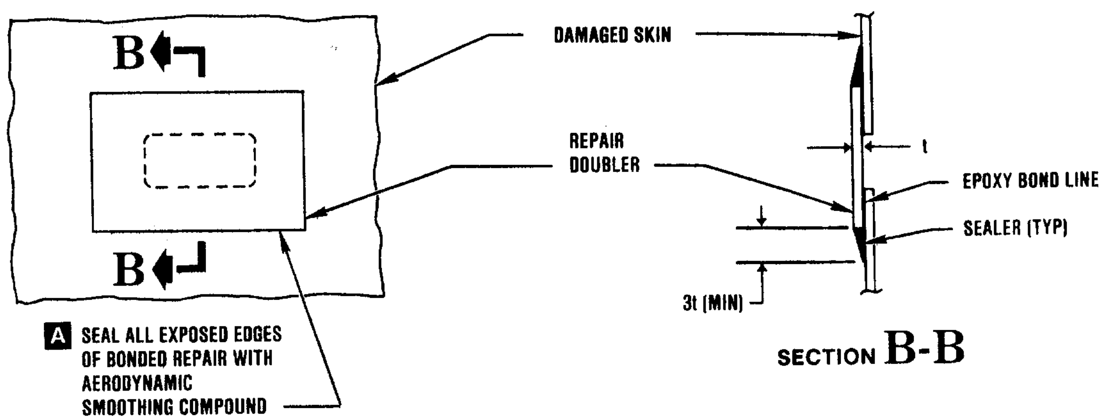
6. Cure (harden) bonding surfaces for 48 hours at 70°F or 8 hours at 140°F, including clamping time. Maintain selected temperature for duration of cure phase.



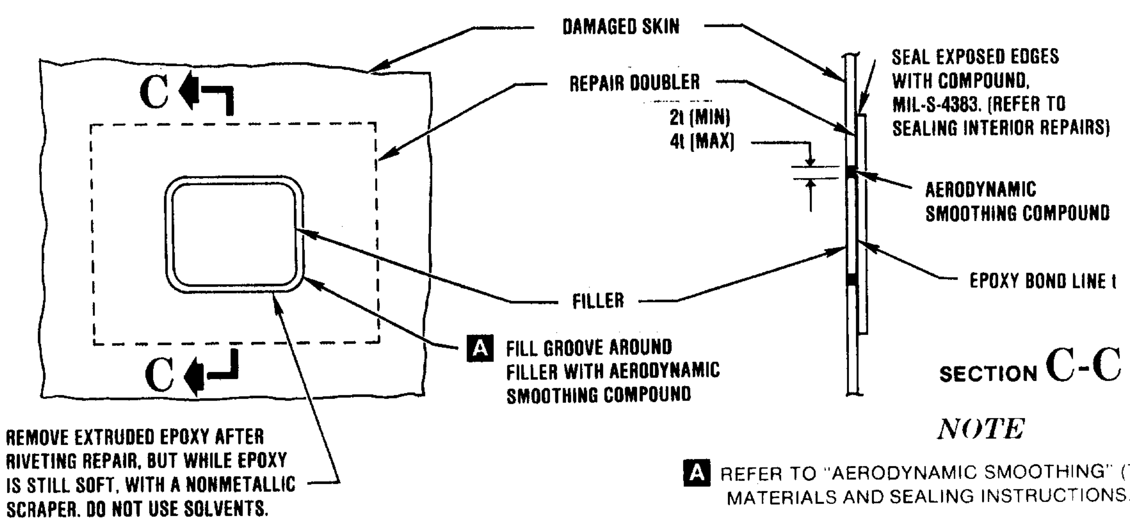
NOTE

REFER TO "STRUCTURAL METAL-TO-METAL BONDING" FOR ADDITIONAL INSTRUCTIONS.

SEALING INTERIOR REPAIRS



SEALING NONFLUSH (TEMPORARY) EXTERNAL REPAIRS



NOTE

A REFER TO "AERODYNAMIC SMOOTHING" (TEXT) FOR MATERIALS AND SEALING INSTRUCTIONS.

SEALING FLUSH EXTERNAL REPAIRS

Sealing Bonded Repairs
Figure 201

REPAIR (Continued)

STRUCTURAL METAL-TO-METAL BONDING (Cont'd)

Procedures (Cont'd)

7. Remove excess adhesive with clean rags soaked in acetone.

NOTE
Clean-up must be accomplished as soon as possible after parts are clamped together.

8. Clean all mixing and spreading tools with clean rags soaked in acetone.

NOTE
If adhesive has hardened before it could be removed, it can be removed with a suitable stripper. (Refer to REMOVING METAL-TO-METAL BONDING REPAIRS).

9. Seal all exposed edges of bonded repairs after repair has cured and metal has been chemical-film-treated.
10. Brush three coats of topcoating compound on exposed edges of bonded repairs inside the structure. (See figure 201.)
11. Seal exposed edges of bonded repairs on the outside of the structure with aerodynamic smoothing compound. (Refer to AERODYNAMIC SMOOTHNESS for required materials and instructions.)

NOTE
The compound may be applied directly to the chemical-film-treated surface without further preparation.

REPAIRING HONEYCOMB PANELS WITH ADHESIVE FILLER

This bonding process may be used only when authorized in specific repair instructions.

Consumables

MATERIAL	SOURCE KEY A
Filler, Corefil 615	039
Curing Agent U	006
Acetone or Methyl Ethyl Ketone (MEK)	001

A Refer to 51-30-00 table 2 for manufacturer.

1. Clean area of repair thoroughly.
2. Remove dirt, oil, or grease in damaged area before trimming out damage.

NOTE
All tools used in trimming and core-crushing operations must be clean.

3. Mix filler per manufacturers recommendations. Filler has a pot life of 20 to 30 minutes.
4. Apply filler with a spatula, putty knife, or similar tool.
5. Fill damaged area with filler. Work out any entrapped air.
6. Fill hole slightly above skin surface to allow for sanding flush after cure.
7. Remove excess filler from surrounding area with MEK.
8. Allow filler to cure (hardened) for 4 hours at 70°F.

NOTE
If ambient temperature is below 70°F, place a 250-watt heat lamp about 3 ft from repair. Do not permit temperatures of filler to exceed 180°F.

REMOVING METAL-TO-METAL BONDED REPAIRS

The following procedure may be used to remove unsatisfactory, damaged, and restricted-life repairs.

Consumables

MATERIAL	SOURCE KEY A
Epoxy Stripper, Cee-Bee A-202	016
Acetone or Methyl Ethyl Ketone (MEK)	001

A Refer to 51-30-00 table 2 for manufacturer.

Procedures

1. Heat repair to 225°F to soften and weaken adhesive.

NOTE
Be careful not to mar surrounding area.

2. Raise one corner of item to be removed.
3. Grip loosened corner with pliers and peel by rolling and curling sheet away from item to which it is attached.

NOTE
Do not use wedges to separate items.

REPAIR (Continued)

WARNING

- ***Do not breathe vapors from the stripper.***
- ***Avoid skin contact with stripper. In case of skin contact, wash affected area immediately with soap and water.***
- ***Do not permit A-202 stripper to contact epoxy which is not to be removed (as in cleanup around a repair).***

4. Brush or spread stripper over the epoxy.
5. Allow several minutes for the stripper to soften the epoxy; then remove material with a wooden or micarta scraper. Repeat operation if necessary.

NOTES

- ***CEE-BEE A-202 stripper is non-corrosive to aluminum alloys.***
- ***Do not permit stripper or solvent to run onto painted surfaces.***

6. Rinse stripped surface with fresh water and wipe with a dry solvent (MEK or acetone).

CORROSION CONTROL

STRUCTURAL IDENTIFICATION

GENERAL

Interior protective treatments and finishes used on the Sabreliner airplane are identified below. Exterior aluminum alloy surfaces are chemical-film-treated by the manufacturer; prime and finish materials are options of the owner.

Material required and application instructions for the finishes noted in the following paragraphs are given in the Corrosion Control Manual, SR-76-023.

GENERAL AIRPLANE

In general, aluminum alloy parts are protected by:

1. Chemical film treatment.
2. Epoxy polyamide primer.

SPEED BRAKE, LANDING GEAR DOORS, AND ENGINE NACELLES

The interior areas of the speed brake, landing gear doors, and engine nacelles are protected by:

1. Chemical film treated (aluminum alloy parts).
2. Epoxy polamide primer.
3. Two coats of polyurethane topcoat.

BATTERY COMPARTMENT

All exposed and faying surfaces within one foot of the storage batteries, and other areas subject to battery spillage, are protected by:

1. Chemical film treatment.
2. Epoxy polyamide primer.
3. Two coats of insignia white Everlube No. 13-511, special or Hi-Impact polyurethane.

WING FUEL TANKS AND MAGNESIUM PARTS

All interior areas of the wing integral fuel tanks and all magnesium parts are protected by:

1. Chemical film treatment (aluminum alloy parts).
2. Dow No. 17 and/or 19 chemical treatment (magnesium parts).
3. Polyurethane coatings for integral fuel tanks, De Soto, Inc. kit #827x376.

EXTERIOR SURFACES

All painted exterior surfaces of the airplane are protected by:

1. Chemical film treatment.
2. Epoxy polyamide primer.
3. Polyurethane topcoat.

MATERIALS

STRUCTURAL IDENTIFICATION

CONSTRUCTION MATERIALS

Most of the materials used in the construction and repair of the Sabreliner airplane may be listed in the following categories: metals (aluminum alloys, steels, etc.), transparent glass and plastic, glass fabric, and fasteners. Much of the aluminum alloy skin, and some of the steel skin, is machine-milled and chem-milled. All detail parts are to assemble without forcing, bending, prying, etc. On parts made to normal allowable tolerances which do not achieve satisfactory fits, a maximum shimming up to 0.064 in. with compatible material, is permissible. The wing attach fittings, the vertical and horizontal stabilizer attach fittings, and the members to which these fittings attach, are not to be shimmed in the area of the attach fittings without specific engineering approval.

Metals used in construction and repair of the airplane are presented in table 1. All repairs presented in this manual depend upon the use of materials conforming to the specifications referenced in these lists.

Sources of materials and tools referenced in repair instructions throughout the manual (except metals and common fasteners) are presented in table 2. The "Source Key" number referenced in the instructions is found in a numerical listing in the "Source Key" column. Each number, except 001, is "keyed" to a manufacturer; 001 indicates that the material may be obtained from any supply house that handles the particular commodity.

Aluminum

As a general-purpose material, 2024 aluminum alloy is used; where greater strength is required, 7075 aluminum alloy is used. Aluminum alloy 7079 is used for die forgings and in place of 7075 where very thick plate is required, and 7178 is used in place of 7075 where greater strength is needed. If there is a doubt as to the identity of sheet metal or extrusion that is damaged, it should be repaired with 7178 of the same gauge or 7075 one gauge heavier. Aluminum alloy TENS 50-T6 is used for sand structural castings. Alloy 6061 is used in areas where extensive welding is required.

Steel

The principal steel alloy used in this airplane is 17-7PH corrosion-resistant.

Glass and Plastic

Transparent glass and plastics are used in this airplane for windshields and cabin windows. Glass fabric is used for radomes and antenna covers.

Fasteners

The majority of the structure of this airplane is assembled with conventional fixed and removable fasteners, such as standard aluminum alloy and steel rivets (driven and blind), screws, bolts, nuts, and quick-acting fasteners. For more details concerning fasteners, refer to 51-40-00 thru 51-40-30.

FABRICATION INFORMATION

Tables

Information providing the necessary data to accomplish the layout and fabrication of repair parts is presented in tables 3 thru 12.

Special Tools and Procedures

Locally manufactured special tools, and/or methods and procedures, are shown in figures 1 thru 5. The special tools/procedures provide methods of reducing the head size of flush rivets, picking up the location of blind or hidden fastener holes, locating hidden skin trim lines, and using drilled out heads of flush fasteners for fillers in dimpled or countersunk holes.

NOTE

The following materials listed in table 1 are used in the construction of the Sabreliner. Repair materials must conform to the referenced specifications, as applicable.

Table 1. Metals Used In Airframe Construction and Repair

MATERIAL	SPECIFICATION	REMARKS
	ALUMINUM BARS AND SHAPES	
2024-0 or 2024-T4 al alloy bar	Fed. Spec QQ-A-225/6	Rolled bar. General-purpose alloy. Use 2024-0 only if forming is too severe for 2024-T4. Do not weld.

STRUCTURAL IDENTIFICATION (Continued)

Table 1. Metals Used In Airframe Construction and Repair (Cont'd)

MATERIAL	SPECIFICATION	REMARKS
ALUMINUM BARS AND SHAPES		
2024-0 or 2024-T4 al alloy bar or shape	Fed. Spec QQ-A-200/3	Extruded bar or shape. Use 2024-0 only if forming is too severe for 2024-T4. Heat-treat all 2024-0 parts to 2024-T42 condition after forming. Do not weld.
7075-0 or 7075-T6 al alloy bar	Fed. Spec QQ-A-225/9	Rolled bar. Do not use where 2024 bar is suitable. 7075-T6 is difficult to form. Heat treat all 7075-0 parts to 7075-T6 condition after forming. Do not weld.
7075-0 or 7075-T6 al alloy bar or shape	Fed. Spec QQ-A-200/11	Extruded bar or shape. Do not use where 2024 bar is suitable. 7075-T6 is difficult to form. Heat-treat all 7075-0 parts to 7075-T6 condition after forming. Do not weld.
7178-0 and 7178-T6 bar or shape	Fed. Spec QQ-A-200/13	Extruded bars and shapes are used in place of 7075 where higher strength is required. Heat-treat all 7178-0 parts to 7178-T6 condition after forming.
ALUMINUM CASTINGS		
TENS 50-T6 al alloy sand casting	NA2-7152, Temp T6	High-strength structural casting alloy. Heat-treatable and weldable.
ALUMINUM FORGINGS		
7079-T652 blocker-type die forging	Fed. Spec QQ-A-367	High-strength casting heat-treated and mechanically stress-relieved. Not weldable.
ALUMINUM HONEYCOMB CORE		
5052-H39 HCB honeycomb core	NA2-7110	Used as a core material in adhesive bonded sandwich structures. Do not use where temperature exceeds 350°F. Available in various core sizes.
ALUMINUM SHEET AND PLATE		
2024-0 or 2024-T3 bare al alloy sheet	Fed. Spec QQ-A-250/4	Gauges from 0.010 to 0.250. Use 2024-0 when part cannot be made from 2024-T3. Heat-treat all 2024-0 parts to 2024-T42 condition after forming. Not weldable.
2024-0, 2024-T3, 2024-T4, and 2024-T42 bare al alloy plate	Fed. Spec QQ-A-250/4	Plate thicknesses from 0.250 to 3.000. Use 2024-0 when parts cannot be formed from 2024-T4. Heat-treat all 2024-0 parts to 2024-T42 condition after forming. Not weldable.
2024-0, 2024-T3, and 2024-T4 clad al alloy sheet	Fed. Spec QQ-A-250/5	Gauges from 0.010 to 0.250. Use 2024-0 only when part cannot be made from 2024-T42. Parts must be heat-treated to T42 condition. May be spot- or seam-welded but not fusion-welded.
2024-0, 2024-T3, 2020-T4, and 2024-T42 clad al alloy plate	Fed. Spec QQ-A-250/5	Gauges from 0.250 to 3.000. Use 2024-0 only when part cannot be made from 2024-T42. Parts must be heat-treated to T42 condition. Not to be fusion-welded.

STRUCTURAL IDENTIFICATION (Continued)

Table 1. Metals Used In Airframe Construction and Repair (Cont'd)

MATERIAL	SPECIFICATION	REMARKS
	ALUMINUM SHEET AND PLATE (Continued)	
6061-0, 6061-T4, and 6061-T6 al alloy sheet or plate	Fed. Spec QQ-A-250/11	Sheet gauges from 0.010 to 0.250. Plate thicknesses from 0.250 to 3.000. Not to be used where other alloys are suitable. Use 6061-0 only if part cannot be made from 6061-T4. Use 6061-T4 only if part cannot be made from 6061-T6. Heat-treat 6061-0 and 6061-T4 to T6 condition when required. May be spot- or seam-welded in the treated condition, and fusion-welded if resultant annealed condition in area of weld is acceptable.
7075-0 and 7075-T6 alclad al alloy sheet and plate	Fed. Spec QQ-A-250/13	Sheet gauges from 0.010 to 0.250. Plate thicknesses from 0.250 to 3.000. Used where 2024 is not suitable. Use 7075-0 only if part cannot be made from 7075-T6. Parts must be heat-treated to T6 condition after forming. May be spot- or seam-welded in the T6 condition. Not to be fusion-welded.
7075-T6 bare al alloy plate	Fed. Spec QQ-A-250/12	Bare material used where clad material is undesirable.
7075-T6 bare al alloy plate	NA2-7138	Used primarily for wing and empennage machined skins.
7079-0 and 7079-T6 bare plate	LB0-170-125	Used in place of 7075 where material 3.000 in. in thickness is required.
7178-0 and 7178-T6 bare and clad al alloy sheet and plate	Fed. Spec QQ-A-250/14	Sheet gauges from 0.010 to 0.250. Plate thickness from 0.250 to 3.000. Used in place of 7075 where higher strength is required.
	MAGNESIUM ALLOYS	
Magnesium alloy bar or shape	NA2-7166 ZK60A-F	General-purpose alloy. Not to be welded.
Magnesium alloy sheet or plate AZ31B-0 or AZ31B-H24	Fed. Spec QQ-M-44	Sheet gauges from 0.020 to 0.250. Use condition 0 for moderately formed parts. Condition H24 is more difficult to form, generally requiring heat, which has an annealing effect. Not to be dimpled.
	STEEL BARS	
1018 steel bar cold finished	Fed. Spec QQ-S-634	Low-carbon steel may be brazed or fusion-welded.
4130 condition D, condition F	Spec MIL-S-6758	Low-alloy steel. Not to be surface-hardened. Condition D (normalized) may be copper-brazed or fusion-welded, but not spot-welded or seam-welded. May be heat-treated.
4340 steel bar, condition D	Spec MIL-S-5000	Low-alloy steel. Not to be surface-hardened. May be fusion-welded, but not spot- or seam-welded.

STRUCTURAL IDENTIFICATION (Continued)

Table 1. Metals Used In Airframe Construction and Repair (Cont'd)

MATERIAL	SPECIFICATION	REMARKS
	STEEL SHEET AND PLATE	
17-7PH CRES sheet or plate	Spec MIL-S-25043	Sheet gauges from 0.006 to 0.187. Plate thicknesses from 0.187 to 0.250. May be used where higher strength formability than can be obtained with Specification MIL-S-5059 1/2 hard is required. Must be heat-treated. Maximum service temperature is 550°F. May be spot- or seam-welded after heat-treating, or fusion-welded before heat-treating.
301 CRES sheet and plate, annealed and 1/2 hard	Spec MIL-S-5059	Sheet gauges from 0.012 to 0.250. Plate thicknesses from 0.250 to 2.000. Unstabilized. Maximum service temperature is 700°F. Annealed material is nonmagnetic. May be spot- or seam-welded but not brazed or fusion-welded.
321 heat-resistant and CRES sheet and plate	Spec MIL-S-6721	Sheet gauges from 0.012 to 0.250. Plate thicknesses from 0.150 to 1.000. Use Specification MIL-S-5059 if possible. Forms easily, annealed and nonmagnetic. Not to be heat-treated. Can be spot- or seam-welded, fusion-welded, or silver-brazed.
1010 steel sheet, condition 5	Fed. Spec QQ-S-698	Sheet gauges from 0.025 to 0.125. Low-carbon steel. Annealed. May be brazed or fusion-welded. May be surface-hardened but not heat-treated.
4130 steel sheet and plate, condition A or N	Spec MIL-S-18729	Sheet gauges from 0.020 to 0.250. Plate thicknesses from 0.250 to 1.000. Low-alloy steel. May be copper-brazed or fusion-welded, but not spot- or seam-welded. Not to be surface-hardened. May be heat-treated.
4340 steel plate	AMS6359	Plate thicknesses from 0.250 to 1.000. Low-alloy steel. May be copper-brazed or fusion-welded, but not spot- or seam-welded. Can be heat-treated to 200,000 to 220,000 psi.
	STEEL TUBING	
4130 steel tube	Spec MIL-T-6736 or AMS6371	Used in the manufacture of steel bushings.
4135 mechanical steel tube	AMS6372	Used in the manufacture of steel bushings.
	BRONZE BAR AND CASTINGS	
Aluminum-bronze bar	AMS4631	Used in the manufacture of bushings and bearings.
Aluminum-bronze castings	Fed. Spec QQ-B-671	May be used as a substitute for aluminum-bronze bar (AMS4631) in the manufacture of bearings and bushings.

STRUCTURAL IDENTIFICATION (Continued)

NOTE

Source key numbers listed in table 2 correspond to those referenced in "Consumables" lists throughout the manual.

Table 2. Sources of Materials

SOURCE KEY	MANUFACTURER
001	Obtainable from applicable vendors
002	Products Research Co Burbank, Calif.
003	B.F. Goodrich Akron, Ohio
004	American Latex Products Corp Hawthorne, Calif.
005	Minnesota Mining & Mfg. Co. St. Paul, Minn.
006	Shell Chemical Corp New York, N.Y.
007	Pyles Industries, Inc Detroit, Mich.
008	Finch Paint & Chemical Co Torrance, Calif.
009	Brooklyn Varnish Mfg Co Brooklyn, N.Y.
010	United States Rubber Co New York, N.Y.
011	Coast Pro Seal & Mfg Co Los Angeles, Calif.
012	Churchill Chemical Corp Los Angeles, Calif.
013	W. P. Fuller & Co Los Angeles, Calif.
014	Turco Products, Inc Los Angeles, Calif.
015	Sherwin-Williams Co Cleveland, Ohio
016	Cee Bee Chemical Co, Inc Downey, Calif.
017	Rockwell International Los Angeles, Calif.
018	Newton Insert Co Los Angeles, Calif.
019	Rosan, Inc Newport Beach, Calif.
020	National Screw & Mfg Co, Calif. Div Los Angeles, Calif.
021	Hi-Shear Corp Torrance, Calif.
022	Elastic Stop Nut Corp of America Union, N.J.
023	Standard Pressed Steel Co Santa Ana, Calif.
024	Cherry Rivet Div of Townsend Co Santa Ana, Calif.
025	Avdel, Inc Burbank, Calif.
026	E.I. du Pont de Nemours & Co Inc Explosives Department Wilmington, Del.
027	Huck Mfg Co Detroit, Mich.
028	Olympic Screw & Rivet Corp Downey, Calif.
029	Air Industries of Calif. Gardena, Calif.
030	Rubber Teck, Inc Gardena, Calif.
031	Parker Seal Co Culver City, Calif.
032	Everlube Corp North Hollywood, Calif.
033	Magnaflux Corp Chicago, Ill.
034	Phillips International Co Div of Phillips Screw Co Natick, Mass.
035	Riehle Testing Machines Div of Ametek, Inc East Moline, Ill.
036	Camloc Fastener Corp Paramus, N.J.
037	Barber-Colman Co Rockford, Ill.

STRUCTURAL IDENTIFICATION (Continued)

Table 2. Sources of Materials (Cont'd)

SOURCE KEY	MANUFACTURER
038	Newage Industries, Inc Jenkintown, Pa.
039	Bloomingdale Department of American Cyanamid Co Havre de Grace, Md.
040	Cabot Corp Boston, Mass.
041	Allied Research Products, Inc Baltimore, Md.
042	ANCHEM Products, Inc. Ambler, Pa.
043	Semco Sales and Service, Inc Inglewood, Calif.
044	Nu-Wipe Inc Plainville, Conn.
045	National Research and Chemical Co Hawthorne, Calif.
046	Nuodex Products Co, Inc. Elizabeth, N.J.
047	Cordo Molding Products, Inc New York, N.Y.
048	J. P. Stevens and Co, Inc New York, N.Y.
049	Deutsch Fastener Corp Los Angeles, Calif.
050	Bauer and Black Division of Kendall Co Chicago, Ill.
051	Permacel Tape Corp New Brunswick, N.J.
052	Grover Manufacturing Co. 620 South Vail Street Montebello, Calif.
053	Lok-Fast, Inc Torrance, Calif.
054	DeSoto Incorporated Des Plains, Ill.
055	Deft Chemical Coatings Irvine, Calif.
056	Sterling Laquer Mfg. Co. St. Louis, Mo.
057	US Paint, Laquer & Chemical Co. St. Louis, Mo.
058	Hysol Division Dexter Corp. Pittsburgh, Calif. 94565
059	Orcon Corp. 1570 Atlantic Street Union City, Ca., 94587-3299

SABRELINER CORPORATION

SIL
SERVICE INFORMATION LETTER

SIL: 57
REV: Basic
DATE: 9-29-00
PAGE: 1 of 1

APPLICABLE: **Model NA265 Series – All Models**

SUBJECT: Sealant

DISCUSSION: Due to sealant manufacturing environmental restrictions, most sealants specified in the Sabreliner Corrosion Control and Structural Repair Manual are obsolete. Replacement sealants have been developed.

INSTRUCTIONS: Attached are two copies of the current sealant list applicable to all models of the Sabreliner Aircraft NA265 Series. Please attach one copy to SR-76-023, chapter 20-20-02, page 3 (Corrosion Control Manual) and the other copy to NA-66-1032, chapter 51-30-00, page 6A (Structural Repair Manual) as a temporary revision until the next manual revision.

SEALANTS
Applicable to Aircraft NA265 Series – All Models

Application	Approved Materials	Reference Specification	Available Class	Condition	Availability
Sealing Exterior Skin Seams & Antennas	P/S 870B P/S 895B CS 2410B AC-632	MIL-S-81733 MIL-S-38228 MIL-S-38228 MIL-S-38228	B-½, B-2, B-4 B-½, B-2 B-2 B-½, B-2	2-Part 2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit Can & Kit
Cabin Pressure and Liquid Tight Sealing	P/S 870B P/S 890B CS 3204B AC-632	MIL-S-81733 MIL-S-8802 MIL-S-8802 MIL-S-38228	B-½, B-2, B-4 B-½, B-2, B-4 B-¼, B-½, B-2, B-4 B-½, B-2	2-Part 2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit Can & Kit
Fay Surface Sealing: Aircraft Structure & Aux Fuel Tank Cmpt. SA0106-106	P/S 890C P/S 870C AC-236C	MIL-S-8802 MIL-S-81733 MIL-S-8802	C-20, C-80 C-12, C-24, C-48 C-20, C-80	2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit
Fuel Bay Bead Sealing: Wing & Aux Fuel Tank Structure	P/S 890B PR-1422B CS 3204B AC-275B AC-236B	MIL-S-8802 MIL-S-8802 MIL-S-8802 AMS 3276 MIL-S-8802	B-½, B-2, B-4 B-½, B-1, B-2 B-¼, B-½, B-2, B-4 B-½, B-2, B-6 B-½, B-1, B-2, B-4, B-6	2-Part 2-Part 2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit Can & Kit Can & Kit
Fuel Bay Sealing	P/S 890A PR-1422A CS 3204A AC-275A	MIL-S-8802 MIL-S-8802 MIL-S-8802 AMS 3276	A-½, A-2 A-½, A-2 A-½, A-1, A-2, A-4 A-½, A-2	2-Part 2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit Can & Kit
Wing Injection Sealant	DC94-011 DC94-031	– –	– –	Pre-Mix Pre-Mix	Can & Kit Can & Kit
Pylon & Firewall High Temp. Sealant	CS 1900 PR-812	MIL-S-38249 MIL-S-38249	– –	2-Part 2-Part	Can & Kit Can & Kit
Wing Leading Edge Anti-Ice High Temp. Sealant	PR-1994B CS 5500B	– MIL-S-83430	B-2 B-½, B-2, B-6	2-Part 2-Part	Can & Kit Can & Kit
Cabin & Cockpit Window Faying Surface, Access Panel & Removable Door Sealant	PR-1428B CS 3330B AC-215B	MIL-S-8784 MIL-S-8784 MIL-S-8784	B-½, B-2 B-½, B-2 B-½, B-2	2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit
Cockpit & Cabin Acrylic & Window Installation	PR-1425B PR-1725B CS 3247B AC-251B	– – – –	B-½, B-2 B-2 B-½, B-2 B-¼, B-½, B-1, B-2	2-Part 2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit Can & Kit
Aerodynamic Smoothing Sealant	P/S 895B CS 2410B AC-632	MIL-S-38228 MIL-S-38228 MIL-S-38228	B-½, B-2 B-2 B-½, B-2	2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit
Quick Repair of Integral Fuel Tanks	CS 3204B AC-250A AC-240B	MIL-S-8802 MIL-S-83318 MIL-S-8802	B-¼ A-1/6, B-1/6 B-½, B-2	2-Part 2-Part 2-Part	Can & Kit Can & Kit Can & Kit

Reference Sabreliner Information Letter 57

Table 2A. Approved Sealants

APPLICATION	PRIMARY	ALTERNATE	MIL SPEC AND/OR COMMERCIAL SPEC.	CLASS	CONDITION	AVAILABLE
SEALING EXTERIOR SKIN SEAMS AND ANTENNAS	PR341	PR895 PS247 PR340	PS895 = MIL-S-38228 PS247 = MIL-S-11031B and MIL-S-7502 PR340 -------------- PR341 --------------	PR341B1/2-B2 PR895B1/2-B2 PS247B2 PR340B1/2-B2	B A + B B B	C + K C + K C + K C + K
CABIN PRESSURE AND LIQUID TIGHT SEALANT	PR1422GB	PS890B PR1422GB PS870B	PS890B = MIL-S-8802 PR1422GB = MIL-S-8802 AND MIL-7502 PS870B = MIL-S-81733 Type II	PS890B1/2-2-4 PR1422GB1/2-B2 PS870B1/2-2-4	A + B A + B A + B	C + K C + K C + K
FAYING SURFACE SEALANT, A/C STRUCTURE AND AUX. FUEL TANK COMPT.	PR1431G	----	PR1431G = MIL-S-81733	PR1431G TYPE 1-4	----	C + K
FUEL BAY BEAD SEALANT, WING STRUCTURE AND AUX. FUEL TANK STRUCTURE	PR1422GB	PR1436GB PR1750B	PR1422GB = MIL-S-7502 AND MIL-8802 PR1436GB = MIL-S-81733/PR1750B = MIL-S-83430C	PR1422GB1/2-B2 PR1436GB1/2-2-4 PR1750B1/2-2-4-6	A + B A + B A + B	C + K C + K C + K
FUEL BAY COVER COATING	PR1422GA	PR1436G PR1750A	PR1422GA = MIL-S-7502 AND MIL-8802 PR1436G = MIL-S-81733/PR1750A = MIL-S-83430CA	PR1422GA1/2-A2 PR1436G PR1750A1/2-A2	A A A	C + K C C + K
WING INJECTION SEALANT	PR703	PR702	PR703 AND PR702 = MIL-A-8625	PR703 PRE MIX PR702 PRE MIX	---- ----	C + K C + K
PYLON AND FIREWALL HIGH TEMP SEALANT	PR810	PR812 PS700	PR812 AND PS700 = MIL-S-38249 PR810 MIL-------	PR812 PRE MIX PR810 PRE MIX PS700 PRE MIS	---- ---- ----	C C C
WING LDG EDGE ANTI-ICE HIGH TEMP. SEALANT	PR1750B	----	PR1750B = MIL-S-83430	PR1750B1/2-2-4-6	A + B	C + K
CABIN AND COCKPIT WINDOW FAYING SURFACE, ACCESS PANEL AND REMOVABLE DOOR SEALANT	PR1321B	PR1403G PS706B	PR1321B = MIL-S-8784 / PS706B = MIL-S-8784 PR1403G = MIL--------	PR1321B1/2-B2 PS706B1/2-B2 PR1403GB1/2-B2	A + B ---- A + B	C + K C + K C + K
COCKPIT AND CABIN ACRYLIC WINDOW INSTALLATION	PR1725	PR1425	-------	PR1725 B2 PR1425 B2	B B	C + K C
WINDSHIELD SEALANT	PR1422GB	PR1725B PS870B	PR1725B = MIL--------- / PR1223B = LAC-40-1035 PS870B = MIL-S-81733 TYPE II	PR1725B-2 PR1422GB2	B B	C + K C + K

CLASS A + BRUSH APPLICATION
CLASS B = INJECTION OR SPATULA

B1/4 = SHORT APPLICATION TIME
B1/2 = " " "
B2 = " " "
B4 = LONG APPLICATION TIME

NOTE

The selection of B1/2 through B4 is made by the user and is determined by the type of application requirement.

NOTE

Application life and cure time vary between different product numbers. Check sealer manufacturer's data for each specific application requirement.

IF TOP COATING IS REQUIRED, USE PR-1005-L. APPLY PER SR-76-023, CHAPTER 20-20-02 PAGE 2 AND THE SEALER MANUFACTURER'S RECOMMENDATION.

FOR SEALER APPLICATION PROCEDURES, CHECK THE CORROSION CONTROL MANUAL SR-76-023 CHAPTER 20-20-00 THROUGH 20-20-32 AND THE STRUCTURAL REPAIR MANUAL NA-66-1032 CHAPTERS 51-10-60 PAGE 201, 51-20-10 PAGES 1 THROUGH 8, 51-20-10 PAGES 201 THROUGH 205.

51-20-10 PAGES 1 THROUGH 8,51-20-10 PAGES 201 THROUGH 205.

AVAILABLE:

C = CAN TYPE CONTAINER
K = SEAMKIT CARTRIDGE

Table 3. Minimum Bend Radii-Aluminum

THICKNESS		2024-O	2024-T4	5052-O	5052-H34	6061-O	6061-T4	6061-T6	7075-O	7075-T6	7178-O	7178-T6
SHEET	0.012	1/32	1/16									
	0.016	1/32	1/16						1/16	1/8	1/16	1/8
	0.020	1/32	1/16	1/32	1/32				1/16	1/8	1/16	1/8
	0.025	1/16	1/16	1/32	1/16	1/32	1/32	1/16	1/16	1/8	1/16	1/8
	0.032	1/16	3/32	1/16	1/16	1/32	1/32	1/16	1/16	1/8	1/16	5/32
	0.040	1/16	3/32	1/16	1/16	1/16	1/16	3/32	1/16	3/16	3/32	7/32
	0.051	1/16	1/8	1/16	3/32	1/16	1/16	3/32	3/32	1/4	1/8	9/32
	0.064	3/32	5/32	1/16	3/32	1/16	3/32	1/8	3/32	5/16	1/8	11/32
	0.072	1/8	7/32						5/32	3/8	3/16	13/32
	0.081	1/8	1/4	1/8	1/8	3/32	5/32	3/16	3/16	7/16	7/32	15/32
	0.091	1/8	9/32	1/8	3/16	3/32	3/16	7/32	1/4	1/2	9/32	17/32
	0.102	5/32	11/32			5/32	1/4	9/32	5/16	9/16	11/32	19/32
	0.125	3/16	7/16	5/32	7/32	5/32	1/4	9/32	11/32	3/4	3/8	13/16
	0.156	1/4	9/16			7/32	3/8	15/32	15/32	15/16	1/2	1
	0.188	11/32	27/32	5/32	1/4	7/32	3/8	15/32	9/16	1-1/8	19/32	1-3/16
PLATE	0.250	15/32	1-1/4			5/16	1/2	5/8	3/4	1-1/2	25/32	1-9/16
	OVER 0.250	2T A	5T A			1-1/2T A	2T A	2-1/2T A	3T A	6T A	3-1/2T A	6-1/2T A

Table 4. Minimum Bend Radii-Steel

		CARBON STEEL				4130, 4137, 4340, AND 8630			
THICKNESS		1010		1020 AND 1095		NORMALIZED		ANNEALED	
		90°	180°	90°	180°	90°	180°	90°	180°
SHEET	0.010								
	0.012			1/32	1/16				
	0.016			1/32	1/16				
	0.018	1/32	1/16						
	0.020			1/32	1/16	1/16	3/32		
	0.024	1/32	1/16						
	0.025			1/16	3/32	1/16	3/32		
	0.030	1/32	1/16			1/16	3/32		
	0.032			1/16	3/32				
	0.035	1/16	1/8	1/16	1/8	1/8	3/16		
	0.036	1/16	1/8						
	0.040								
	0.042			1/16	1/8	1/8	3/16		
	0.045								
	0.048	1/16	1/8						
	0.049			3/32	1/8				
	0.050					1/8	3/16		
	0.060	1/16	1/8						
	0.063					1/8	3/16		
	0.065			3/32	1/8				
	0.072			1/8	3/16				
	0.075	3/32	3/16						
	0.078					5/32	1/4		
	0.080								
	0.083			1/8	3/16	5/32	1/4		
	0.090								
	0.093					3/16	3/8	3/32	5/32
	0.095			3/16	1/4				
	0.104	1/8	1/4						
	0.109			3/16	1/4	7/32	7/16	1/8	3/16
	0.112								
	0.119	1/8	1/4						
	0.120			3/16	1/4				
	0.125					1/4	1/2	1/8	3/16
	0.134	3/16	3/8	1/4	3/8				
	0.156			1/4	3/8	5/16	5/8	5/32	1/4
	0.188			5/16	3/8	3/8	3/4	3/16	9/32
PLATE	0.250			3/8	1/2	1/2	1	1/4	3/8
	OVER 0.250			1-1/2T A	2T A	1-1/2T A	5T A	1-1/2T A	2T A

NOTE

A T = MATERIAL THICKNESS (ROUND OFF BEND RADIUS TO NEXT LARGEST 1/32.)

Table 5. **Minimum Bend Radii-Cres, Incond, and Titanium**

THICKNESS		AISI-302 AISI-321 AISI-347		AISI-302		350 17-7PH	INCONEL INCONEL X	19-9DL 19-9DX	19-9DL 19-9DX	PURE AMS4900 AMS4901 NAS7123	ALLOY AMS4908 NAS7125
		ANNEALED		½ HARD		ANNEALED			STRESS RELIEVED		
		90°	180°	90°	180°	90°	90°	90°	90°	90°	90°
SHEET	0.010			1/32	1/16						
	0.012	1/32	1/32	1/32	1/16						
	0.016	1/32	1/32	1/32	1/16					1/16	
	0.018									1/16	
	0.020	1/32	1/16	1/16	3/32	1/16	1/32	1/16	1/16	1/16	
	0.024										
	0.025	1/32	1/16	1/16	3/32	1/16	1/32	1/16	1/16	3/32	1/8
	0.028									3/32	5/32
	0.030										
	0.032	1/32	1/16	1/16	3/32	1/16	1/32	1/16	3/32	1/8	5/32
	0.035										
	0.036	1/16	1/8	1/8	3/16	3/32	1/16	3/32	3/32	1/8	5/32
	0.040	1/16	1/8	1/8	3/16	3/32	1/16	3/32	1/8	1/8	3/16
	0.042										
	0.045	1/16	1/8	1/8	3/16					5/32	3/16
	0.048										
	0.049										
	0.050	1/16	1/8	1/8	3/16	1/8	1/16	1/8	1/8	5/32	7/32
	0.056									3/16	1/4
	0.060										
	0.063	1/16	1/8	1/8	3/16	1/8	1/16	1/8	5/32	3/16	9/32
	0.065										
	0.071									1/4	3/8
	0.072										
	0.075										
	0.078										
	0.080	3/32	3/16	3/16	5/16	3/16	3/32	1/4	9/32	9/32	13/32
	0.083										
	0.090	3/32	3/16	3/16	5/16	3/16	3/32	9/32	5/16	5/16	15/32
	0.093										
	0.095										
	0.100									3/8	1/2
	0.104										
	0.109										
	0.112	1/8	1/4	1/4	3/8	1/4	1/8	3/8	13/32	13/32	9/16
	0.119										
	0.120										
	0.125	1/8	1/4	1/4	3/8	1/4	1/8	3/8	7/16	7/16	5/8
	0.134										
	0.140									1/2	23/32
	0.156										
	0.160									9/16	13/16
	0.180									21/32	29/32
PLATE	0.188	3/16	3/8			3/8	3/16	9/16	11/16		
	0.190					13/32	3/16	5/8	11/16		
	0.250	1/4	1/2			1/2	1/4	3/4	7/8		
	OVER 0.250	2T A	2T A			2T A	1T A				

NOTE

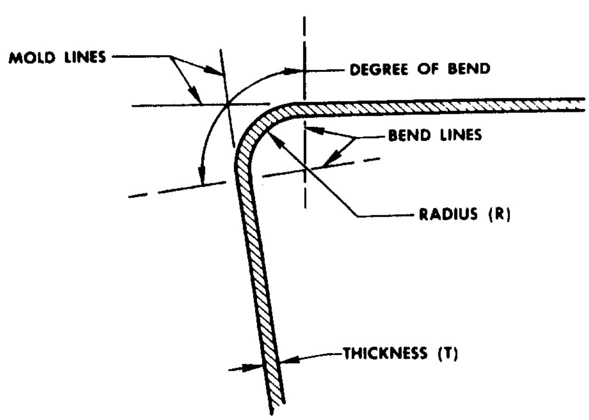
A T = MATERIAL THICKNESS (ROUND OFF BEND RADIUS TO NEXT LARGEST 1/32.)

Table 6. Bend Allowance Coefficients For Aluminum Alloys. Based On One-Degree Angle

RADII	METAL THICKNESS											
	0.016	0.020	0.022	0.025	0.032	0.040	0.050	0.063	0.080	0.090	0.125	0.180
1/32	0.00067	0.00070	0.00072	0.00074	0.00079	0.00086	0.00094	0.00104	0.00117	0.00125	0.00154	0.00200
1/16	0.00121	0.00125	0.00126	0.00129	0.00135	0.00140	0.00149	0.00159	0.00171	0.00180	0.00209	0.00255
3/32	0.00176	0.00179	0.00180	0.00183	0.00188	0.00195	0.00203	0.00213	0.00226	0.00234	0.00263	0.00309
1/8	0.00230	0.00234	0.00235	0.00238	0.00243	0.00249	0.00258	0.00268	0.00281	0.00289	0.00317	0.00364
5/32	0.00285	0.00288	0.00290	0.00292	0.00297	0.00304	0.00312	0.00322	0.00335	0.00343	0.00372	0.00418
3/16	0.00339	0.00342	0.00344	0.00347	0.00352	0.00358	0.00367	0.00377	0.00390	0.00398	0.00426	0.00473
7/32	0.00394	0.00397	0.00398	0.00401	0.00406	0.00412	0.00421	0.00431	0.00444	0.00452	0.00481	0.00527
1/4	0.00448	0.00451	0.00454	0.00456	0.00461	0.00467	0.00476	0.00486	0.00499	0.00507	0.00535	0.00582
9/32	0.00503	0.00506	0.00507	0.00510	0.00515	0.00521	0.00530	0.00540	0.00553	0.00561	0.00590	0.00636
5/16	0.00557	0.00560	0.00562	0.00564	0.00570	0.00576	0.00584	0.00595	0.00608	0.00616	0.00644	0.00691
11/32	0.00612	0.00615	0.00616	0.00619	0.00624	0.00630	0.00639	0.00649	0.00662	0.00670	0.00699	0.00745
3/8	0.00666	0.00669	0.00671	0.00673	0.00679	0.00685	0.00693	0.00704	0.00717	0.00725	0.00753	0.00800
13/32	0.00721	0.00724	0.00725	0.00728	0.00733	0.00739	0.00748	0.00758	0.00771	0.00779	0.00808	0.00854
7/16	0.00775	0.00778	0.00780	0.00782	0.00787	0.00794	0.00802	0.00812	0.00826	0.00834	0.00862	0.00908
15/32	0.00829	0.00833	0.00834	0.00837	0.00842	0.00848	0.00857	0.00867	0.00880	0.00888	0.00917	0.00963
1/2	0.00884	0.00887	0.00889	0.00891	0.00896	0.00903	0.00911	0.00921	0.00935	0.00943	0.00971	0.01017
17/32	0.00938	0.00942	0.00943	0.00946	0.00951	0.00957	0.00966	0.00976	0.00989	0.00997	0.01025	0.01072
9/16	0.00993	0.00996	0.00998	0.01000	0.01005	0.01012	0.01020	0.01030	0.01043	0.01051	0.01080	0.01126
19/32	0.01047	0.01051	0.01052	0.01055	0.01058	0.01065	0.01073	0.01083	0.01098	0.01105	0.01133	0.01179
5/8	0.01102	0.01105	0.01107	0.01109	0.01114	0.01121	0.01129	0.01139	0.01152	0.01160	0.01189	0.01235
21/32	0.01156	0.01160	0.01161	0.01164	0.01170	0.01175	0.01183	0.01193	0.01207	0.01214	0.01245	0.01289
11/16	0.01211	0.01214	0.01216	0.01218	0.01223	0.01230	0.01238	0.01248	0.01261	0.01269	0.01298	0.01344
23/32	0.01265	0.01268	0.01269	0.01273	0.01276	0.01283	0.01291	0.01301	0.01316	0.01322	0.01351	0.01397
3/4	0.01320	0.01323	0.01324	0.01327	0.01332	0.01338	0.01347	0.01357	0.01370	0.01378	0.01407	0.01453
25/32	0.01374	0.01378	0.01379	0.01381	0.01386	0.01392	0.01401	0.01411	0.01425	0.01432	0.01461	0.01507
13/16	0.01429	0.01432	0.01433	0.01436	0.01441	0.01447	0.01456	0.01466	0.01479	0.01487	0.01516	0.01562
27/32	0.01483	0.01486	0.01487	0.01490	0.01494	0.01501	0.01509	0.01519	0.01534	0.01540	0.01569	0.01615
7/8	0.01538	0.01541	0.01542	0.01545	0.01550	0.01556	0.01565	0.01575	0.01588	0.01596	0.01625	0.01671
29/32	0.01592	0.01595	0.01596	0.01599	0.01604	0.01610	0.01619	0.01629	0.01643	0.01650	0.01679	0.01727
15/16	0.01646	0.01650	0.01651	0.01654	0.01659	0.01665	0.01674	0.01684	0.01697	0.01705	0.01734	0.01780
31/32	0.01701	0.01704	0.01705	0.01708	0.01712	0.01718	0.01727	0.01737	0.01752	0.01758	0.01787	0.01833
1	0.01755	0.01759	0.01760	0.01763	0.01768	0.01774	0.01783	0.01793	0.01806	0.01814	0.01843	0.01888

THE EMPIRICAL FORMULA FOR FINDING THE BEND ALLOWANCE OF MATERIAL REQUIRED FOR A BEND = (0.01743 × RADIUS) + (0.0078 × THICKNESS)

THIS EQUALS THE MATERIAL REQUIRED FOR 1° OF BEND.



1 Multiply the numbers in the table by the degrees of bend to determine the amount of material required for the bend

Example:
95° bend, 1/8 in. radius, 0.040 in.
material 0.00249 × 95 = 0.2365 in.

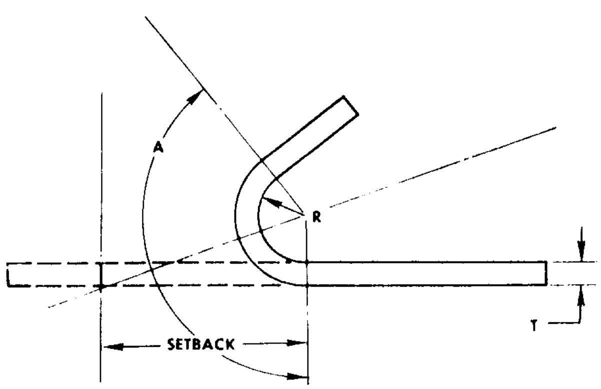
2 For bends larger than one in. radius, the amount of material required for the bend is calculated as the arc of a circle, the radius of which is taken to the center of the material.

Example:
90° bend, 1 in. radius, 0.064 in. material.
Radius to center of material = bend radius (1 in.) + 1/2 material thickness = 1 + 0.032 = 1.032in.

$$\text{Circumference of arc} = \frac{2R \times \text{degree of bend}}{360 \text{ (total degrees in circle)}}$$

Table 7. Bend Allowance Set Back

ANGLE DEGREE	K	ANGLE DEGREE	K	ANGLE DEGREE	K	ANGLE DEGREE	K	ANGLE DEGREE	K	ANGLE DEGREE	K
1	0.00873	31	0.27732	61	0.58905	91	1.0176	121	1.7675	151	3.8667
2	0.01745	32	0.28674	62	0.60086	92	1.0355	122	1.8040	152	4.0108
3	0.02618	33	0.29621	63	0.61208	93	1.0538	123	1.8418	153	4.1653
4	0.03493	34	0.30573	64	0.62487	94	1.0724	124	1.8807	154	4.3315
5	0.04366	35	0.31530	65	0.63707	95	1.0913	125	1.9210	155	4.5107
6	0.05241	36	0.32492	66	0.64941	96	1.1106	126	1.9626	156	4.7046
7	0.06116	37	0.33459	67	0.66188	97	1.1303	127	2.0057	157	4.9151
8	0.06993	38	0.34433	68	0.67451	98	1.1504	128	2.0503	158	5.1455
9	0.07870	39	0.35412	69	0.68728	99	1.1708	129	2.0965	159	5.3995
10	0.08749	40	0.36397	70	0.70021	100	1.1917	130	2.1445	160	5.6713
11	0.09629	41	0.37388	71	0.71329	101	1.2131	131	2.1943	161	5.9758
12	0.10510	42	0.38386	72	0.72654	102	1.2349	132	2.2460	162	6.3137
13	0.11393	43	0.39391	73	0.73996	103	1.2572	133	2.2998	163	6.6911
14	0.12278	44	0.40403	74	0.75355	104	1.2799	134	2.3558	164	7.1154
15	0.13165	45	0.41421	75	0.76733	105	1.3032	135	2.4142	165	7.5957
16	0.14054	46	0.42447	76	0.78128	106	1.3270	136	2.4751	166	8.1443
17	0.14945	47	0.43481	77	0.79543	107	1.3514	137	2.5386	167	8.7769
18	0.15838	48	0.44523	78	0.80978	108	1.3764	138	2.6051	168	9.5144
19	0.16734	49	0.45573	79	0.82434	109	1.4019	139	2.6746	169	10.385
20	0.17633	50	0.46631	80	0.83910	110	1.4281	140	2.7475	170	11.430
21	0.18534	51	0.47697	81	0.85408	111	1.4550	141	2.8239	171	12.706
22	0.19438	52	0.48773	82	0.86929	112	1.4826	142	2.9042	172	14.301
23	0.20345	53	0.49858	83	0.88472	113	1.5108	143	2.9887	173	16.350
24	0.21256	54	0.50952	84	0.90040	114	1.5399	144	3.0777	174	19.081
25	0.22169	55	0.52057	85	0.91633	115	1.5697	145	3.1716	175	22.904
26	0.23087	56	0.53171	86	0.93251	116	1.6003	146	3.2708	176	26.636
27	0.24008	57	0.54295	87	0.94896	117	1.6318	147	3.3759	177	38.188
28	0.24933	58	0.55431	88	0.96569	118	1.6643	148	3.4874	178	57.290
29	0.25862	59	0.56577	89	0.98270	119	1.6977	149	3.6059	179	114.590
30	0.26795	60	0.57735	90	1.00000	120	1.7320	150	3.7320	180	INFINITE



Example:

Angle of bend (A) = 140°
Material thickness (T) = 0.064 in.
Radius (R) = 0.125 in.
K—from table = 2.7475

SETBACK = K × (T + R) =
2.7475 × (0.064 + 0.125) =
2.7475 × 0.189 = 0.509
SETBACK = 0.509 IN.

Table 8. TAP DRILL SIZES

NC Coarse Thread		NF Fine Thread	
SCREW SIZE	TAP DRILL	SCREW SIZE	TAP DRILL
7/16-14	U	7/16-20	25/64
1/2-13	27/64	1/2-20	29/64
9/16-12	31/64	9/16-18	33/64
5/8-11	17/32	5/8-18	37/64
11/16-11	19/32	11/16-11	5/8
3/4-10	21/32	3/4-16	11/16
13/16-10	23/32	7/8-14	13/16
7/8- 9	49/64	1 -14	15/16
15/16- 9	53/64	1-1/8-12	1-3/64
1 - 8	7/8	1-1/4-12	1-11/64
1-1/8- 7	63/64	1-1/2-12	1-27/64
1-1/4- 7	1-7/64		
1-1/2- 6	1-11/32		

Table 9. MACHINE SCREW

SCREW SIZE	DRILLS FOR	
	TAP	CLEARANCE
2 -56	No. 50	No. 43
3 -48	No. 47	No. 40
4 -40	No. 43	No. 32
6 -32	No. 36	No. 28
8 -32	No. 29	No. 19
10 -24	No. 25	No. 10
10 -32	No. 21	No. 10
12 -24	No. 16	7/32
1/4 -20	No. 7	1/4
1/4 -28	No. 3	1/4
5/16 -18	F	5/16
5/16 -24	I	5/16
3/8 -16	5/16	3/8
3/8 -24	Q	3/8

Table 10. PIPE

DIAMETER OF TAP	DRILLS FOR	
	TAP	CLEARANCE
1/8- 27	11/32	7/16
1/4- 18	7/16	7/16
3/8- 18	37/64	3/4
1/2- 14	23/32	7/8
3/4- 14	59/64	1-3/16
1 -11-1/2	1- 5/32	1-7/16
1-1/4-11-1/2	1- 1/2	1-3/4
1-1/2-11-1/2	1-47/64	2
2 -11-1/2	2- 7/32	2-1/2
2-1/2- 8	2- 5/8	3
3 - 8	3- 1/4	3-3/4
3-1/2- 8	3- 3/4	4-1/4
4 - 8	4- 1/4	4-3/4

Table 11. DECIMAL EQUIVALENTS
NUMBER, LETTER, AND FRACTIONAL SIZE DRILLS

SIZE DRILL	DECI-MAL	SIZE DRILL	DECI-MAL	SIZE DRILL	DECI-MAL
80	0.0135	1/8	0.1250	21/64	0.3281
79	0.0145	30	0.1285	Q	0.3320
1/64	0.0156	29	0.1360	R	0.3390
78	0.0160	28	0.1405	11/32	0.3437
77	0.0180	9/64	0.1406	S	0.3480
76	0.0200	27	0.1440	T	0.3580
75	0.0210	26	0.1470	23/64	0.3594
74	0.0225	25	0.1495	U	0.3680
73	0.0240	24	0.1520	3/8	0.3750
72	0.0250	23	0.1540	V	0.3770
71	0.0260	5/32	0.1562	W	0.3860
70	0.0280	22	0.1570	25/64	0.3906
69	0.0292	21	0.1590	X	0.3970
68	0.0310	20	0.1610	Y	0.4040
1/32	0.0313	19	0.1660	13/32	0.4062
67	0.0320	18	0.1695	Z	0.4130
66	0.0330	11/64	0.1719	27/64	0.4219
65	0.0350	17	0.1730	7/16	0.4375
64	0.0360	16	0.1770	29/64	0.4531
63	0.0370	15	0.1800	15/32	0.4687
62	0.0380	14	0.1820	31/64	0.4843
61	0.0390	13	0.1850	1/2	0.5000
60	0.0400	3/16	0.1875	33/64	0.5156
59	0.0410	12	0.1890	17/32	0.5312
58	0.0420	11	0.1910	35/64	0.5469
57	0.0430	10	0.1935	9/16	0.5625
56	0.0465	9	0.1960	37/64	0.5781
3/64	0.0469	8	0.1990	19/32	0.5937
55	0.0520	7	0.2010	39/64	0.6094
54	0.0550	13/64	0.2031	5/8	0.6250
53	0.0595	6	0.2040	41/64	0.6406
1/16	0.0625	5	0.2055	21/32	0.6562
52	0.0635	4	0.2090	43/64	0.6719
51	0.0670	3	0.2130	11/16	0.6875
50	0.0700	1/32	0.2187	45/64	0.7031
49	0.0730	2	0.2210	23/32	0.7187
48	0.0760	1	0.2280	47/64	0.7344
5/64	0.0781	A	0.2340	3/4	0.7500
47	0.0785	15/64	0.2344	49/64	0.7656
46	0.0810	B	0.2380	25/32	0.7812
45	0.0820	C	0.2420	51/64	0.7969
44	0.0860	D	0.2460	13/16	0.8125
43	0.0890	1/4	0.2500	53/64	0.8281
42	0.0935	F	0.2570	27/32	0.8437
3/32	0.0937	G	0.2610	55/64	0.8594
41	0.0960	17/64	0.2656	7/8	0.8750
40	0.0980	H	0.2660	57/64	0.8906
39	0.0995	I	0.2720	29/32	0.9062
38	0.1015	J	0.2770	59/64	0.9219
37	0.0140	K	0.2811	15/16	0.9375
36	0.0165	9/32	0.2812	61/64	0.9531
7/64	0.1093	L	0.2900	31/32	0.9687
35	0.1100	M	0.2950	63/64	0.9844
34	0.1110	19/64	0.2968	1	1.000
33	0.1130	N	0.3020		
32	0.1160	5/16	0.3125		
31	0.1200	O	0.3160		
		P	0.3230		

Table 12. Circumference and Area

OF ONE INCH				INCHES OR FEET					
DIAMETER		CIRCUM.	AREA	DIAM.	CIRCUM.	AREA	DIAM.	CIRCUM.	AREA
FRACTION	DECIMAL								
1/64	0.015625	0.04909	0.00019	1	3.1416	0.7854	64	201.06	3216.99
1/32	0.03125	0.09818	0.00077	2	6.2832	3.1416	65	204.20	3318.31
3/64	0.046875	0.14726	0.00173	3	9.4248	7.0686	66	207.35	3421.19
1/16	0.0625	0.19635	0.00306	4	12.5664	12.5664	67	210.49	3525.65
5/64	0.078125	0.24545	0.00479	5	15.7080	19.635	68	213.63	3631.68
3/32	0.09375	0.29452	0.00690	6	18.850	28.274	69	216.77	3739.28
7/64	0.109375	0.34363	0.00939	7	21.991	38.485	70	219.91	3848.45
1/8	0.125	0.39270	0.01227	8	25.133	50.266	71	223.05	3959.19
9/64	0.140625	0.44181	0.01553	9	28.274	63.617	72	226.19	4071.50
5/32	0.15625	0.49087	0.01917	10	31.416	78.540	73	229.34	4185.39
11/64	0.171875	0.53999	0.02320	11	34.558	95.033	74	232.48	4300.84
3/16	0.1875	0.58905	0.02761	12	37.699	113.1	75	235.62	4417.86
13/64	0.203125	0.63817	0.03241	13	40.841	132.73	76	238.76	4536.46
7/32	0.21875	0.68722	0.03758	14	43.982	153.94	77	241.90	4656.63
15/64	0.234375	0.73635	0.04314	15	47.124	176.71	78	245.04	4778.36
1/4	0.25	0.78540	0.04909	16	50.265	201.06	79	248.19	4901.67
17/64	0.265625	0.83453	0.05542	17	53.407	226.98	80	251.33	5026.55
9/32	0.28125	0.88357	0.06213	18	56.549	254.47	81	254.47	5153.
19/64	0.296875	0.93271	0.06922	19	59.690	283.53	82	257.61	5281.02
5/16	0.3125	0.98175	0.07670	20	62.832	314.16	83	260.75	5410.61
21/64	0.328125	1.0309	0.08456	21	65.973	346.36	84	263.89	5541.77
11/32	0.34375	1.0799	0.09281	22	69.115	380.13	85	267.04	5674.50
23/64	0.359375	1.1291	0.10144	23	72.257	415.48	86	270.18	5808.80
3/8	0.375	1.1781	0.11045	24	75.398	452.39	87	273.32	5944.68
25/64	0.390625	1.2273	0.11984	25	78.540	490.87	88	276.46	6082.12
13/32	0.40625	1.2763	0.12962	26	81.681	530.93	89	279.60	6221.14
27/64	0.421875	1.3254	0.13979	27	84.823	572.56	90	282.74	6361.73
7/16	0.4375	1.3744	0.15033	28	87.965	615.75	91	285.88	6503.88
29/64	0.453125	1.4236	0.16126	29	91.106	660.52	92	289.03	6647.61
15/32	0.46875	1.4726	0.17257	30	94.248	706.86	93	292.17	6792.91
31/64	0.484375	1.5218	0.18427	31	97.389	754.77	94	295.31	6939.78
1/2	0.5	1.5708	0.19635	32	100.53	804.25	95	298.45	7088.22
33/64	0.515625	1.6199	0.20880	33	103.67	855.30	96	301.59	7238.23
17/32	0.53125	1.6690	0.22166	34	106.81	907.92	97	304.73	7389.81
35/64	0.546875	1.7181	0.23489	35	109.96	962.11	98	307.88	7542.96
9/16	0.5625	1.7671	0.24850	36	113.10	1017.88	99	311.02	7697.69
37/64	0.578125	1.8163	0.26248	37	116.24	1075.21	100	314.16	7853.98
19/32	0.59375	1.8653	0.27688	38	119.38	1134.11	101	317.30	8011.85
39/64	0.609375	1.9145	0.29164	39	122.52	1194.59	102	320.44	8171.28
5/8	0.625	1.9635	0.30680	40	125.66	1256.64	103	323.58	8332.29
41/64	0.640625	2.0127	0.32232	41	128.81	1320.25	104	326.73	8494.87
21/32	0.65625	2.0617	0.33824	42	131.95	1385.44	105	329.87	8659.01
43/64	0.671875	2.1108	0.35453	43	135.09	1452.20	106	333.01	8824.73
11/16	0.6875	2.1598	0.37122	44	138.23	1520.53	107	336.15	8992.02
45/64	0.703125	2.2090	0.38828	45	141.37	1590.43	108	339.29	9160.88
23/32	0.71875	2.2580	0.40574	46	144.51	1661.90	109	342.43	9331.32
47/64	0.734375	2.3072	0.42356	47	147.65	1734.94	110	345.58	9503.32
3/4	0.75	2.3562	0.44179	48	150.80	1809.56	111	348.72	9676.89
49/64	0.765625	2.4054	0.46038	49	153.94	1885.74	112	351.86	9852.03
25/32	0.78125	2.4544	0.47937	50	157.08	1963.50	113	355.	10028.75
51/64	0.796875	2.5036	0.49872	51	160.22	2042.82	114	358.14	10207.03
13/16	0.8125	2.5525	0.51849	52	163.36	2123.72	115	361.28	10386.89
53/64	0.828125	2.6017	0.53862	53	166.50	2206.18	116	364.42	10568.32
27/32	0.84375	2.6507	0.55914	54	169.65	2290.22	117	367.57	10751.32
55/64	0.859375	2.6999	0.58003	55	172.79	2375.83	118	370.71	10935.88
7/8	0.875	2.7489	0.60132	56	175.93	2463.01	119	373.85	11122.02
57/64	0.890625	2.7981	0.62298	57	179.07	2551.76	120	376.99	11309.73
29/32	0.90625	2.8471	0.64504	58	182.21	2642.08	121	380.13	11499.01
59/64	0.921875	2.8959	0.66748	59	185.35	2733.97	122	383.27	11689.87
15/16	0.9375	2.9452	0.69029	60	188.50	2827.43	123	386.42	11882.29
61/64	0.953125	2.9945	0.71349	61	191.64	2922.47	124	389.56	12076.28
31/32	0.96875	3.0434	0.73708	62	194.78	3019.07	125	392.70	12271.85
63/64	0.984375	3.0928	0.76097	63	197.92	3117.25	126	395.84	12468.98

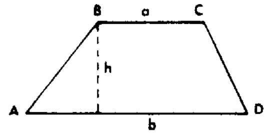
Diameter multiplied by 3.1416 = circumference. Circumference multiplied by 0.3183 = diameter.
Square of the diameter multiplied by 0.7854 = area.

PLANE FIGURES

TRAPEZOID
(a parallel to b)

AREA = $\frac{a + b}{2} h$

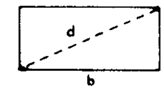
(h is perpendicular to a and b)



RECTANGLE

AREA = bh

DIAGONAL $d = \sqrt{b^2 + h^2}$

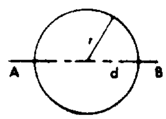


CIRCLE

CIRCUMFERENCE = πd
= $2 \pi r$

AREA = πr^2
= $\frac{\pi}{4} d^2$
= $0.7854 d^2$

$\pi = \frac{\text{Circumference}}{\text{diameter}}$ = 3.1416

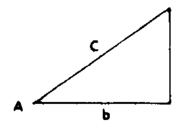


RIGHT TRIANGLE

AREA = $\frac{ba}{2}$

HYPOTENUSE = $c = \sqrt{a^2 + b^2}$

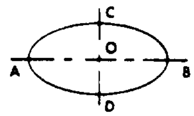
$A^\circ + B^\circ + C^\circ$ = 180 degrees



ELLIPSE

AREA = $\pi (OA) \times (OC)$

= $\frac{\pi}{4} (AB) \times (CD)$

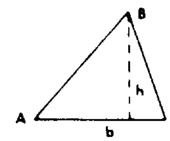


ANY TRIANGLE

AREA = $\frac{bh}{2}$

(h is perpendicular to b)

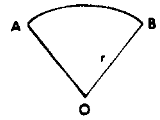
$A^\circ + B^\circ + C^\circ$ = 180 degrees



SECTOR

AREA = $\frac{r(\text{arc } AB)}{2}$

= $\frac{\pi r^2 (\text{angle } AOB)}{360 \text{ degrees}}$

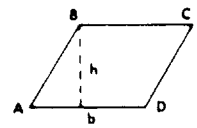


PARALLELOGRAM
(opposite sides parallel)

AREA = bh

(h is perpendicular to b)

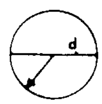
$A^\circ + B^\circ + C^\circ + D^\circ$ = 360 degrees



SOLID FIGURES

SPHERE

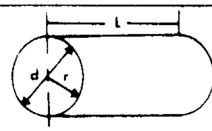
VOLUME = $\frac{4}{3} \pi r^3 = \pi \frac{d^3}{6}$ AREA = $4 \pi r^2 = \pi d^2$



CYLINDER

VOLUME = $\pi r^2 = 0.7854 d^2 L$

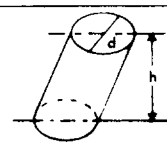
AREA OF CYLINDRICAL SURFACE = πDL



CYLINDER

VOLUME = (area base)h

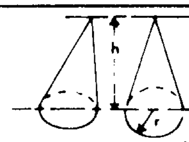
AREA OF CYLINDRICAL SURFACE = (perimeter base) h



CONE

VOLUME (OF EITHER) = $\frac{1}{3} \pi r^2 h$

AREA (OF RIGHT CONE) = πr^2

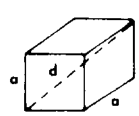


CUBE

VOLUME = a^3

DIAGONAL = $d = a\sqrt{3}$

TOTAL AREA = $6a^2$

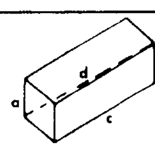


RECTANGULAR PRISM

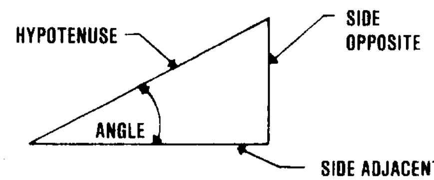
VOLUME = (area of end)C
= abc

DIAGONAL = $d = \sqrt{a^2 + b^2 + c^2}$

TOTAL AREA = $2(ab + bc + ca)$



FUNCTIONS OF ANGLES



SINE = $\frac{\text{Side Opposite}}{\text{Hypotenuse}}$ COSINE = $\frac{\text{Side Adjacent}}{\text{Hypotenuse}}$

TANGENT = $\frac{\text{Side Opposite}}{\text{Side Adjacent}}$ COTANGENT = $\frac{\text{Side Adjacent}}{\text{Side Opposite}}$

SECANT = $\frac{\text{Hypotenuse}}{\text{Side Adjacent}}$ COSECANT = $\frac{\text{Hypotenuse}}{\text{Side Opposite}}$

CONVERSION OF FRACTION TO DECIMAL

TO CONVERT FRACTION TO DECIMAL . . . .

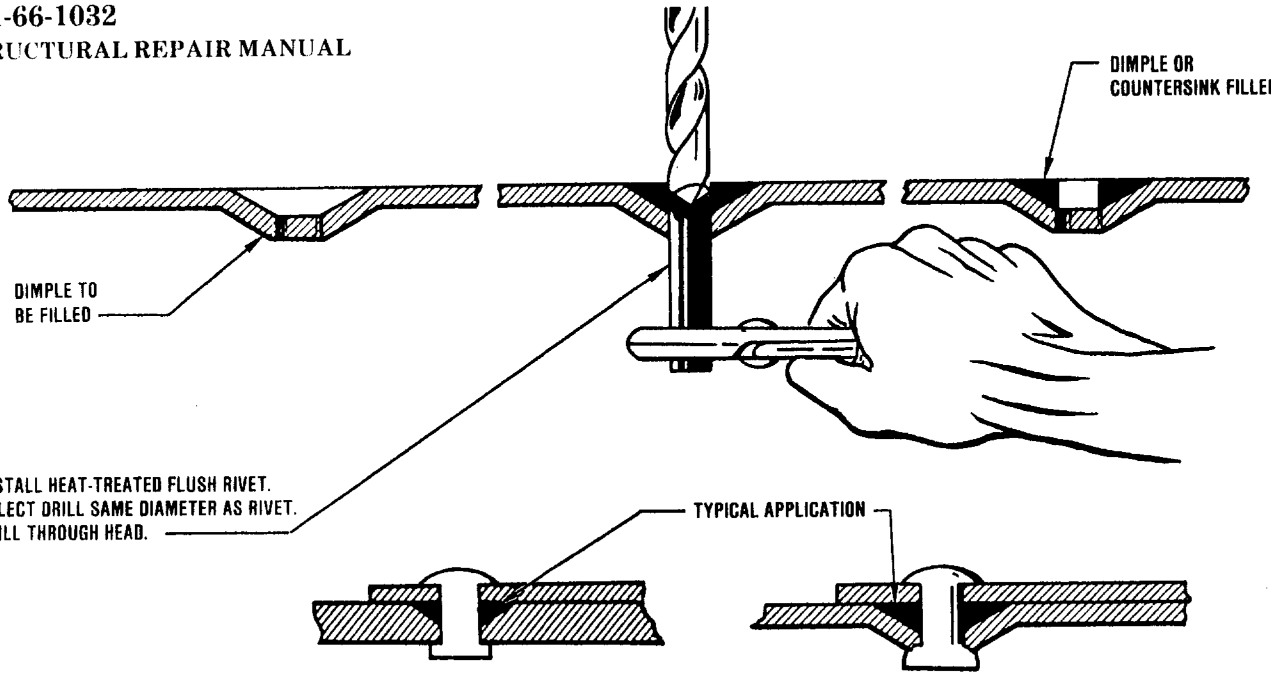
DIVIDE NUMERATOR (TOP) BY DENOMINATOR (BOTTOM)

EXAMPLE: $\frac{5}{8}$

```
   0.625
8)5.000
  4 8
  ---
   20
   16
   --
    40
    40
    --
     0
```

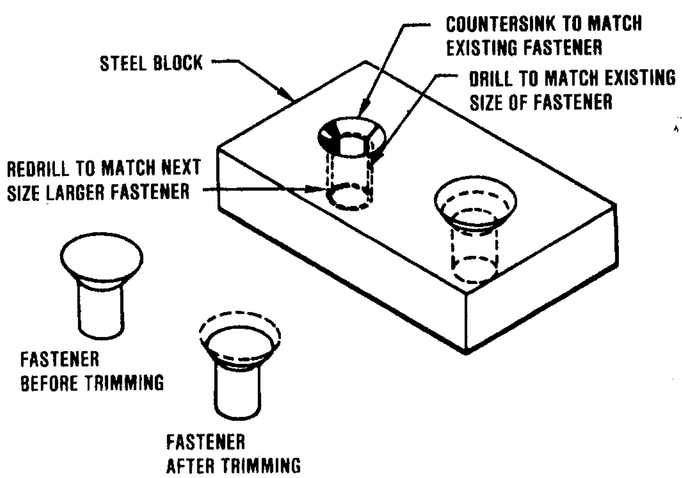
$\frac{5}{8} = 0.625$

Shop Mathematics
Figure 1



FILLING DIMPLED AND COUNTERSUNK HOLES

IN CASES WHERE A DIMPLED OR COUNTERSUNK HOLE HAS BECOME ENLARGED, AND IT IS NOT POSSIBLE TO REDIMPLE OR COUNTERSINK FOR THE NEXT SIZE LARGER FASTENER, THE FOLLOWING METHOD MAY BE USED TO TRIM THE NEXT SIZE LARGER FASTENER HEAD TO MATCH THE EXISTING DIMPLES OR COUNTERSINKS.



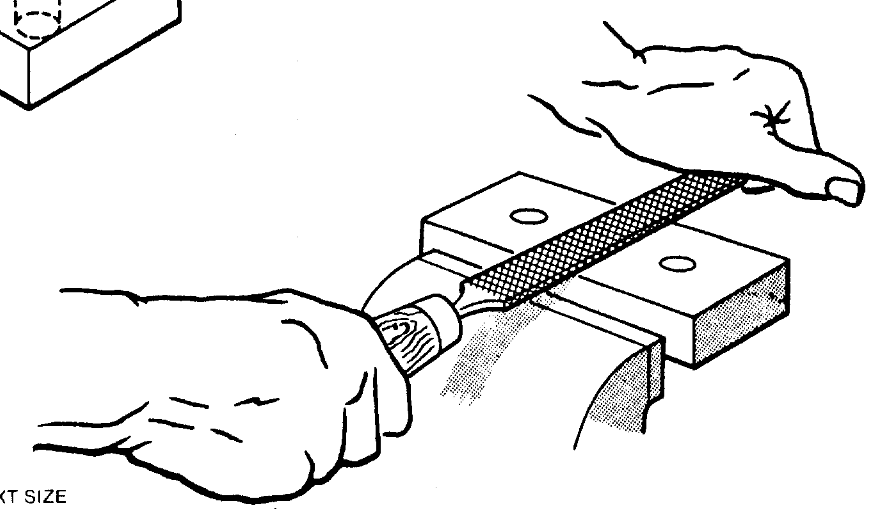
1 Drill a hole in a steel block the same size as the existing fastener.

2 Countersink the drilled hole so that the existing size fastener head is flush with the surface of the steel block.

3 Redrill hole to next size larger fastener diameter.

4 Place the fastener to be used in the countersunk hole in the steel block, and file or grind off head flush with the surface of the block.

5 Install the fastener to be used in redrilled holes. After installation, coat head of fastener with two coats of zinc-chromate primer, and paint to match surrounding area.



NOTE

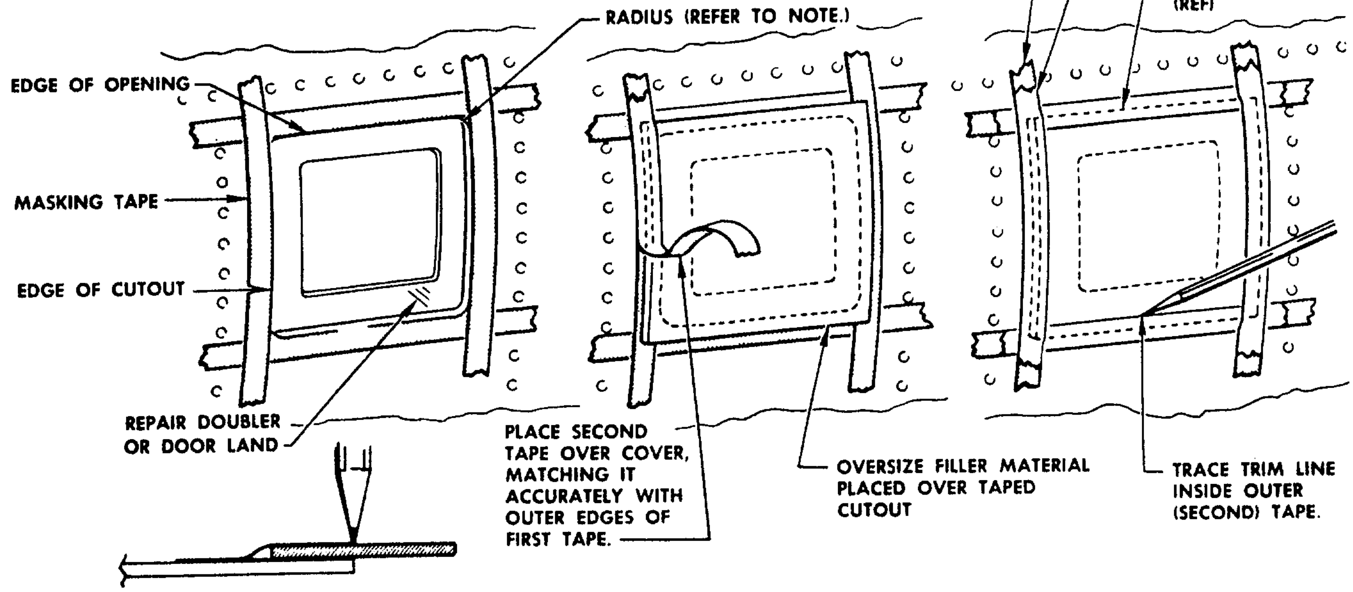
THIS METHOD TO BE USED ONLY FOR THE NEXT SIZE LARGER FASTENER.

TRIMMING FASTENER HEADS

Trimming Fastener Heads and Filling Countersunk Holes
Figure 2

NOTES

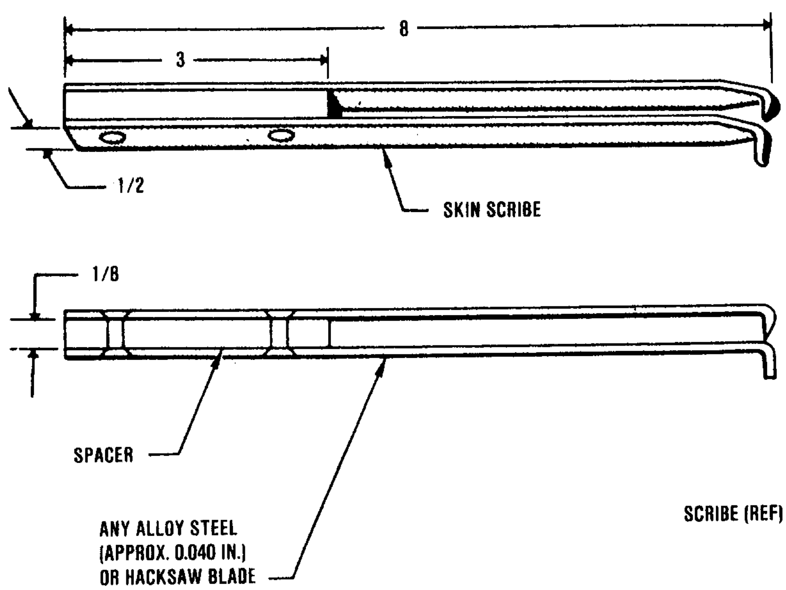
- PERFORM ALL FASTENING OPERATIONS ON COVERS AND DOORS, AND SECURE PART FIRMLY IN PLACE BEFORE TRIMMING.
- USE RADIUS GAUGE OR DISK TO DUPLICATE RADIUS.

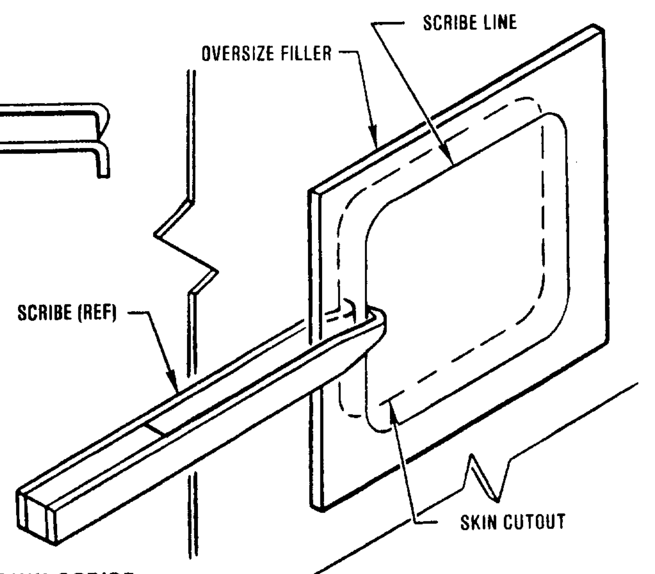


WITH MASKING TAPE

NOTES

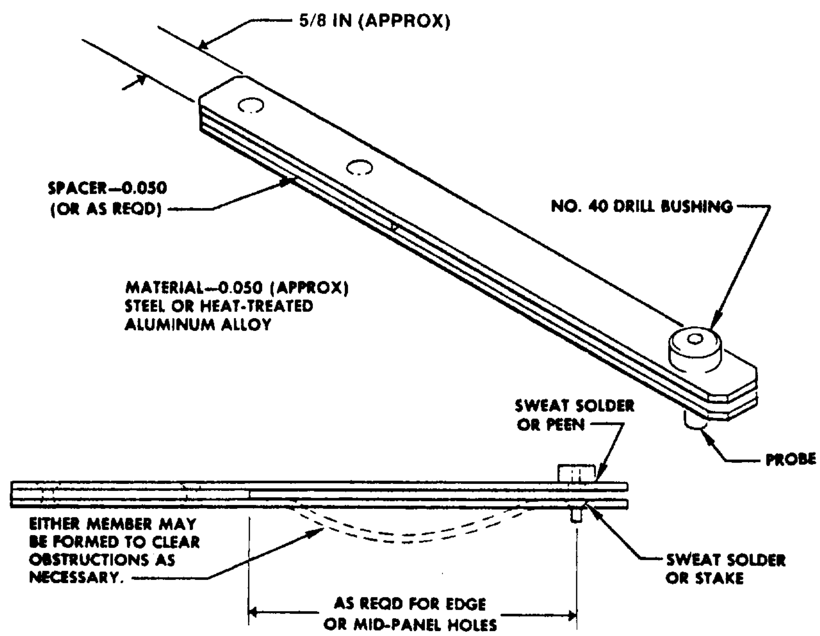
- TRIM OUT DAMAGED AREA. CUT FILLER OVERSIZE. PLACE FILLER OVER CUTOUT, AND INSERT SKIN SCRIBE. HOLD FILLER FIRMLY IN PLACE, AND SLIDE SCRIBE AROUND CUTOUT.
- THIS TRIM MARKING METHOD IS NOT RECOMMENDED FOR FITTING COVERS AND DOORS.
- DIMENSIONS ARE SHOWN IN INCHES.





WITH SKIN SCRIBE

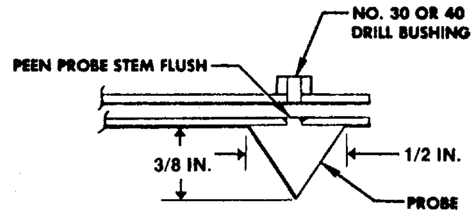
Locating Skin Trim Lines
Figure 3



LOCATING BLIND HOLES WITH HOLE FINDERS

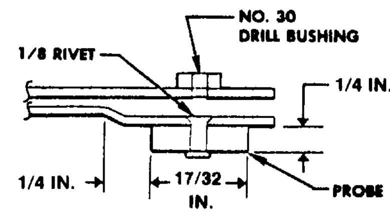
NOTE

SHAPES OF THE HOLE FINDERS SHOWN ARE ONLY EXAMPLES. OTHER CONFIGURATIONS WILL BE REQUIRED FOR ACCOMPLISHING MANY JOBS. MAIN POINTS TO KEEP IN MIND WHEN MAKING A HOLE FINDER ARE (1) PROBE MUST FIT SNUGLY IN HOLE, AND (2) DRILL BUSHING OR TRANSFER PUNCH HOLE MUST BE ACCURATELY CENTERED OVER PROBE. TO ACCOMPLISH LATTER, ASSEMBLY SHOULD BE LINE-DRILLED.



SCREW LOCATOR

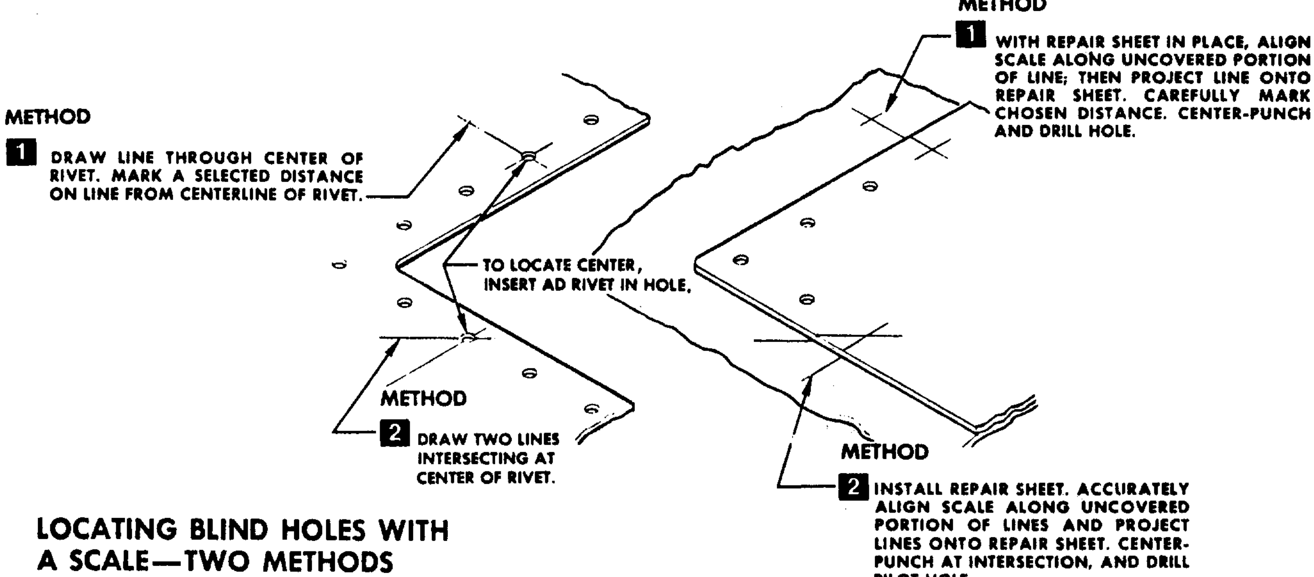
THIS VARIATION OF HOLE FINDER MAY BE USED FOR LOCATING LARGER HOLES OF VARIOUS SIZES, SUCH AS SCREW HOLES IN UNDRILLED STRUCTURAL DOORS AND COVERS.



CAMLOC STUD LOCATOR

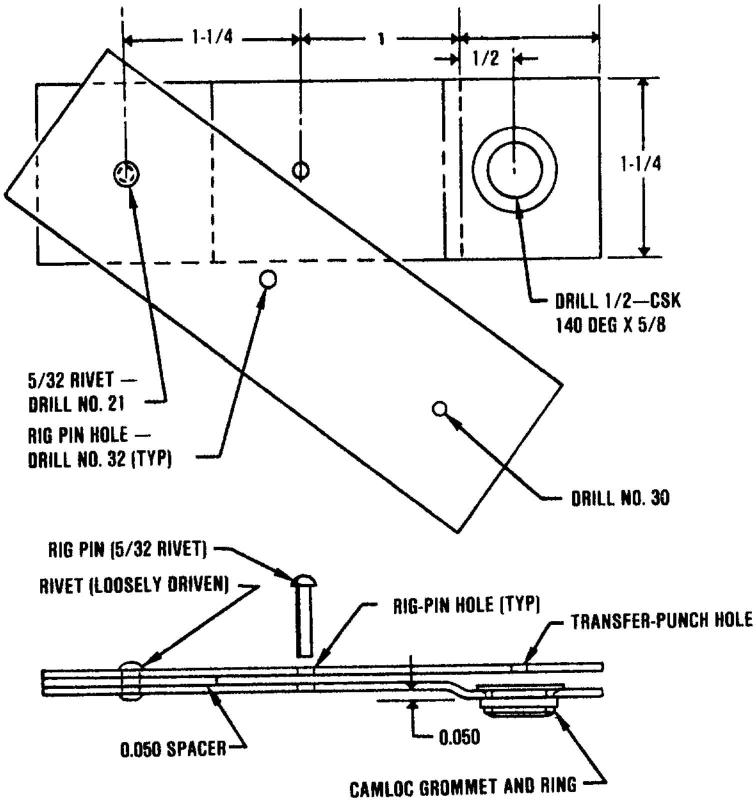
THIS VARIATION OF HOLE FINDER MAY BE USED FOR LOCATING CAMLOC STUDS (4002 SERIES) IN UNDRILLED COVERS AND DOORS.

WHEN FREQUENT FITTING OF BLANK COVERS AND DOORS IS EXPECTED, A SET OF LOCATING TOOLS SIMILAR TO CAMLOC STUD LOCATOR IS RECOMMENDED.



LOCATING BLIND HOLES WITH A SCALE—TWO METHODS

Locating Blind Holes
Figure 4



CAMLOC STUD LOCATOR

NOTES

- THIS TYPE OF CAMLOCK STUD LOCATOR IS RECOMMENDED WHEN REGULAR REPLACEMENT OF DOORS AND COVERS IS EXPECTED. A LOCATOR IS INSTALLED IN EACH CAMLOC RECEPTACLE UNDER DOOR OR COVER BEING FITTED.
- DIMENSIONS IN INCHES UNLESS OTHERWISE INDICATED.

FABRICATION

1 Fabricate all parts from 0.050 in. 2024-T4 or 7075-T6 clad material.

2 Cut sheet-metal strips and spacers.

3 Joggle lower (collar-retaining) strip.

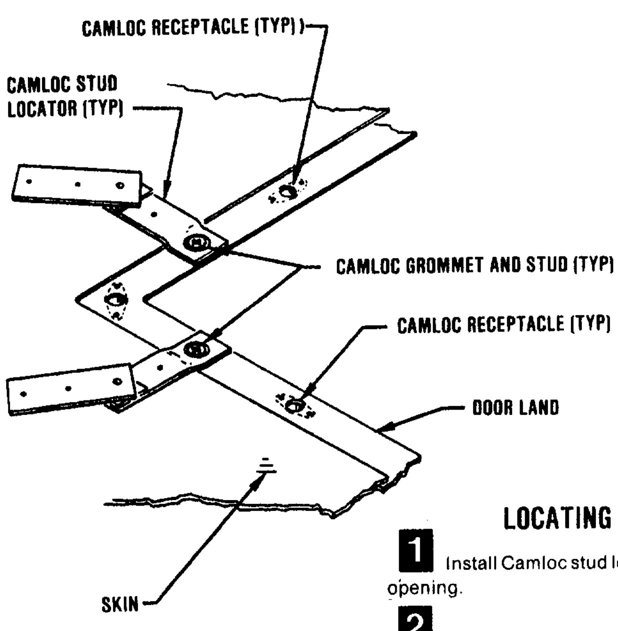
4 Align and clamp strips and 0.050 in. spacer in drill vise, and insert a 0.100 in. spacer between strips at joggled end.

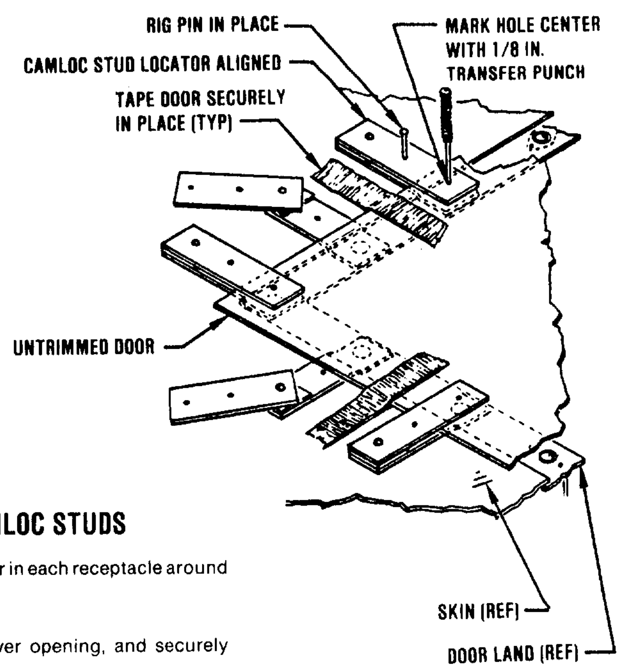
5 Through all parts, drill a No. 21 rivet hole, a No. 21 rig-pin hole, and a No. 30 transfer-punch hole.

6 Remove upper strip and spacers from vise. Reclamp lower strip; drill and countersink 1/2 in. Camloc collar hole.

7 Install Camloc collar.

8 Assemble parts, and rivet them. To ensure alighment, rig pin should be in place during riveting operation.





LOCATING CAMLOC STUDS

1 Install Camloc stud locator in each receptacle around opening.

2 Align untrimmed door over opening, and securely tape it in place.

3 Align locator, install rig pin, and mark center of stud location. Repeat procedure on each locator around opening.

Locating Access Door Fastener Locations
Figure 5

FASTENERS

STRUCTURAL IDENTIFICATION

GENERAL

The fasteners used in this airplane are for the most part the conventional fixed and removable types and are installed in accordance with accepted practice. However, specific instructions concerning fasteners in the repair illustrations should be strictly observed. Unless otherwise noted in this manual, the minimum fastener edge distance is two fastener diameters from the center of the hole to the edge of the material, and minimum spacing is 5-1/2 fastener diameters. For general fastener descriptions, refer to table 1.

THREADED FASTENER INSTALLATION

Structural bolts or screws one dash number above or below that called out on the drawing and not more than three washers of same style and material as drawing callout may be used providing no interference occurs as a result, to produce proper grip conditions and meet the limitations of threads in bearing.

Non-structural bolts or screws three dash numbers above or below that called out on the drawing may be used, providing no interference occurs as a result.

Unless approved by Engineering, deviation will not be permitted from the number of washers or the dash number specified on the drawing for bolts or screws used in conjunction with screw thread inserts.

Bolts and screws with drilled heads may be used in place of bolts or screws without drilled heads.

Bolts 1/4 in. in diameter and smaller used with self-locking nuts must be without cotter pin holes.

Unless otherwise specified on the engineering drawing, corrosion resistant steel fasteners only shall be used together.

Bolts and screws shall run free enough to engage the threads of threaded parts by hand without using a wrench.

On Navy models only, aluminum alloy parts shall be separated from cadmium-plated bolts, screws (except flush head fasteners) and nuts (except plate nuts) by using P/N LD153-0011 aluminum alloy washers.

Machine screw type speed nuts shall not be used with sheet metal screws or vice versa. The screw type and size is usually stamped on the top side of the nut. Screw length may be determined by adding 1/4, for the No. 4 and No. 6 screws, and 5/16, for No. 8 and No. 10, to the total material thickness.

Particular attention must be given to the use of specially crimped nuts and plate nuts for use with bolts and screws with 0.003 undersized pitch diameters. These screws are used in temperature areas above 900°F. Using standard nut elements with these screws will result in loosening of the connection. These nuts will always be designated by a commercial nut callout of special configuration at the locking element.

Excessive tightening of nut will overstress the fastener, causing distortion or stripping of the threads, while insufficient tightening produces loose joints. Imperfect threads shall not be jam-tightened, unless otherwise shown on the drawing.

For speed nut installations, tighten screw until arch base of nut is flat against the work surface and the lowest prong is flush with the base of the nut. Speed nuts depend upon the axial tension of the screw to be self-locking.

Taps shall not be used on any threaded parts, unless otherwise shown on the drawing.

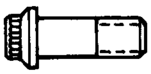
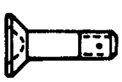
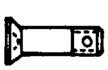
Bolts, studs, and other threaded parts having holes for safetying shall be safetied. Threaded parts having no holes for safetying in the head shall be used in self-locking devices or parts identified by a ring of dots on the head (which identifies them as parts equipped with self-locking means on the thread shank) shall be used.

When a fastener is installed in a nut, at least a portion of one thread, preferably one full thread, shall be above the top of the nut.

The surfaces under the nut and head of the fastener should provide a complete seat for same and be reasonably smooth.

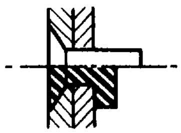
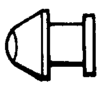
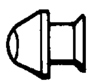
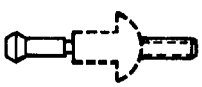
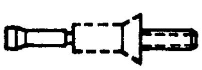
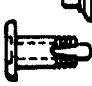
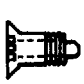
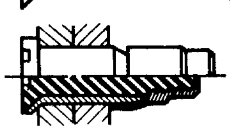
Wherever practical and where no conflict with the engineering drawing will occur, the heads of threaded fasteners should be located up and/or forward to preclude their loss in event of malfunction. The heads are also understood to be on the near side unless otherwise specified on the drawing.

Table 1. General Fastener Information

SKETCH OF FASTENER	CALLOUT	CODE A	MATERIAL	MINIMUM STRENGTH (KSI) B	MAX TEMP	REMARKS
CONVENTIONAL THREADED						
	MS20004		MIL-B-7838	160 TS C	260°C (500°F)	INTERNAL WRENCHING BOLTS
	MS21250			180 TS C	260°C (500°F)	12-POINT EXTERNAL WRENCHING BOLTS
	AN3, AN4, ETC		MIL-B-6812	125 TS C	260°C (500°F)	
	NAS1103			125 TS D	260°C (500°F)	
				95SS		
	AN509		MIL-B-7839	125 TS C	260°C (500°F)	PHILLIPS RECESS, TENSION HEAD
	NAS1292R		RENE' 41	100SS D	871°C (1600°F)	SOLID SHEAR HEAD
	NAS1292J		H-11	156SS	427°C (800°F)	SOLID SHEAR HEAD
	NAS1322R		RENE' 41	100SS D	871°C (1600°F)	SOLID SHEAR HEAD
	NAS1322J		H-11	156SS	427°C (800°F)	SOLID SHEAR HEAD
	7S32		4130	160 TS	260°C (500°F)	TORQ-SET RECESS, FILLISTER HEAD
	7S32C		A286	140 TS	649°C (1200°F)	TORQ-SET RECESS, FILLISTER HEAD
	7S32J		H-11	260 TS	427°C (800°F)	TORQ-SET RECESS, FILLISTER HEAD
	7S33		4130	160 TS C	260°C (500°F)	TORQ-SET RECESS, FILLISTER HEAD SHORTER THREAD LENGTH
	7S33C		A286	140 TS	649°C (1200°F)	TORQ-SET RECESS, FILLISTER HEAD SHORTER THREAD LENGTH
	7S33J		H-11	260 TS	427°C (800°F)	TORQ-SET RECESS, FILLISTER HEAD SHORTER THREAD LENGTH
	7S34		4130	160 TS	260°C (500°F)	TORQ-SET RECESS, TENSION HEAD
	7S34C		A286	140 TS	649°C (1200°F)	TORQ-SET RECESS, TENSION HEAD
	7S34J		H-11	260 TS	427°C (800°F)	TORQ-SET RECESS, TENSION HEAD
	7S35		4130	160 TS C	260°C (500°F)	TORQ-SET RECESS, TENSION HEAD SHORTER THREAD LENGTH
	7S35C		A286	140 TS	649°C (1200°F)	TORQ-SET RECESS, TENSION HEAD SHORTER THREAD LENGTH
	7S35J		H-11	260 TS	427°C (800°F)	TORQ-SET RECESS, TENSION HEAD SHORTER THREAD LENGTH
	7S36		4130	95SS	260°C (500°F)	TORQ-SET RECESS, SHEAR HEAD
	7S36C		A286	90SS	649°C (1200°F)	TORQ-SET RECESS, SHEAR HEAD
	7S36R		RENE' 41	100SS	871°C (1600°F)	TORQ-SET RECESS, SHEAR HEAD
	7S36S		17-4-PH	120SS	343°C (650°F)	TORQ-SET RECESS, SHEAR HEAD
	7S36J		H-11	156SS	427°C (800°F)	TORQ-SET RECESS, SHEAR HEAD
	7S37		4130	95SS	260°C (500°F)	TORQ-SET RECESS, SHEAR HEAD SHORTER THREAD LENGTH
	7S37C		A286	90SS D	649°C (1200°F)	TORQ-SET RECESS, SHEAR HEAD SHORTER THREAD LENGTH
	7S37R		RENE 41	100SS	871°C (1600°F)	TORQ-SET RECESS, SHEAR HEAD SHORTER THREAD LENGTH
	7S37S		17-4 PH	120SS	343°C (650°F)	TORQ-SET RECESS, SHEAR HEAD SHORTER THREAD LENGTH
	7S37J		H-11	156SS	427°C (800°F)	TORQ-SET RECESS, SHEAR HEAD SHORTER THREAD LENGTH

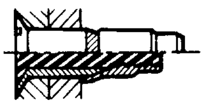
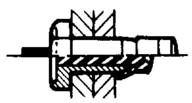
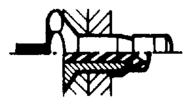
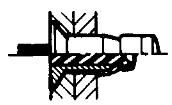
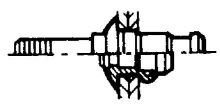
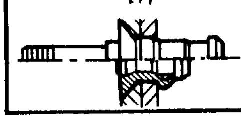
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Table 1. General Fastener Information (Cont'd)

SKETCH OF FASTENER	CALLOUT	CODE A	MATERIAL	MINIMUM STRENGTH (KSI) B	MAX TEMP	REMARKS
CONVENTIONAL RIVETS						
	MS20470AD	BJ	2117-T3	30 SS	93°C (200°F)	
	MS20470DD	CX	2024-T31	41 SS	93°C (200°F)	
	MS20615M	BO	MONEL	49 SS	538°C (1000°F)	
	NAS1198	MM	A286	90 SS	649°C (1200°F)	
	2R16		A286	54 SS	649°C (1200°F)	
	MS20426B	BC	5056	28 SS D	93°C (200°F)	
	MS20426AD	BB	2117-T3	30 SS	93°C (200°F)	
	MS20426DD	CY	2024-T31	41 SS	93°C (200°F)	
	MS20427M	BF	MONEL	49 SS	538°C (1000°F)	
	NAS1199	MN	A286	90 SS	649°C (1200°F)	
	NAS1200	MO	A286	90 SS	649°C (1200°F)	SHEAR HEAD
	NAS1097DD	MC	2024-T31			
	2R14		MONEL	49 SS	538°C (1000°F)	SHEAR HEAD
	2R15		A286	54 SS	649°C (1200°F)	
	NAS1054	HO	4130	95 SS	260°C (500°F)	USE WITH NAS528 OR HS32 COLLAR.
	HS68	HR	431	125 SS	427°C (800°F)	USE WITH HS60M COLLAR.
	HS92		A286	95 SS D	649°C (1200°F)	USE WITH HS60M COLLAR.
	HS128		17-4PH	120 SS	427°C (800°F)	USE WITH HS60M COLLAR.
	NAS1055	CA	4130	95 SS	260°C (500°F)	USE WITH NAS528 OR HS32 COLLAR.
	HS67	HP	431	125 SS	427°C (800°F)	USE WITH HS60M COLLAR.
	HS91		A286	95 SS	649°C (1200°F)	USE WITH HS60M COLLAR.
	HS127		17-4PH	120 SS	427°C (800°F)	USE WITH HS60M COLLAR.
BLIND FASTENERS						
	MS20600B		5056		93°C (200°F)	
	MS20600AD	AA	2117-T3		93°C (200°F)	
	MS20600M		MONEL		538°C (1000°F)	ALSO AVAILABLE WITH CAD PLATING (MP).
	MS20601B		5056		93°C (200°F)	
	MS20601AD	AC	2117-T3		93°C (200°F)	
	MS20601M		MONEL		538°C (1000°F)	ALSO AVAILABLE WITH CAD PLATING (MP).
	MS20602AD	AF	2017-T4		93°C (200°F)	
	PA286 ( )A	KX	A286		649°C (1200°F)	DUPONT EXPLOSIVE RIVETS (BLAST-FREE)
	MS20603AD	AH	2017-T4		93°C (200°F)	
	PA286 ( )100		A286		649°C (1200°F)	DUPONT EXPLOSIVE RIVETS (BLAST-FREE)
	CR6624	JN	A286		649°C (1200°F)	HARD-STEM CHERRY RIVETS
	CR6626		A286		649°C (1200°F)	SOFT-STEM CHERRY RIVETS
	CR6634	JL	A286		649°C (1200°F)	HARD-STEM CHERRY RIVETS
	CR6636	ML	A286		649°C (1200°F)	SOFT-STEM CHERRY RIVETS
	6951-S-	AW	303		343°C (650°F)	DEUTSCH DRIVE PIN RIVETS
	7951-H-	HT	17-4PH		427°C (800°F)	DEUTSCH DRIVE PIN RIVETS
	6950-S-	AV	303		343°C (650°F)	DEUTSCH DRIVE PIN RIVETS
	7950-H-	HS	17-4PH		427°C (800°F)	DEUTSCH DRIVE PIN RIVETS
	SVP-		H-11		427°C (800°F)	SPS SLEEV-LOCK RIVETS

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Table 1. General Fastener Information (Cont'd)

SKETCH OF FASTENER	CALLOUT	CODE [A]	MATERIAL	MINIMUM STRENGTH (KSI) [B]	MAX TEMP	REMARKS
BLIND FASTENERS						
	SVF-		H-11		427°C (800°F)	SPS SLEEV-LOCK RIVETS
	P---	DR	4037		260°C (500°F)	JO-BOLT RIVETS
	P---A	JP	A286		649°C (1200°F)	JO-BOLT RIVETS
	P---J		H-11		427°C (800°F)	JO-BOLT RIVETS
	FA---		7075-T6		93°C (200°F)	JO-BOLT RIVETS, MILLABLE HEAD
	F---	DK	4037		260°C (500°F)	JO-BOLT RIVETS
	F---A	JR	A286		649°C (1200°F)	JO-BOLT RIVETS
	F---J		H-11		427°C (800°F)	JO-BOLT RIVETS
	P	CE	ALUMINUM		93°C (200°F)	HUCK RIVETS (CKL)
	100V	CD	ALUMINUM		93°C (200°F)	HUCK RIVETS (CKL)
	OS		ALUMINUM		93°C (200°F)	HUCK RIVETS, OVERSIZE

NOTES

[A] FASTENER BASIC CODE LETTERS USED ON NAA ASSEMBLY DRAWINGS

[B] KSI—KIP (1000 LB) PER SQUARE IN.

[C] TENSILE STRENGTH

[D] SINGLE SHEAR

FASTENER INSTALLATION CODING USED ON ASSEMBLY DRAWINGS.

FASTENER CODING

CONVENTIONAL AND BLIND RIVETS SHALL BE INSTALLED PER NAA SPECIFICATION LA0101-004.	HI-SHEAR RIVETS, BOLTS, NUTS, SCREWS, AND STUDS SHALL BE INSTALLED PER NAA SPECIFICATION LA0101-001.
BASIC CODE LETTERS (1) DASH NO. FOR DIA (2) MFD HEAD NEAR SIDE (3) BB | 5 / D2 — 3 REQD FLUSH RIVETING OPERATIONS (4)	DASH NO. FOR DIA (2) MFD HEAD FAR SIDE (3) AW | OGF / 4 — 3 REQD DASH NO. FOR LENGTH OR GRIP (2)

(2) DASH NUMBERS FOR RIVET DIAMETER, LENGTH, OR GRIP ARE OBTAINED FROM RIVET DRAWINGS.

(3) MANUFACTURED RIVET HEADS ARE UNDERSTOOD TO BE ON THE NEAR SIDE OF THE DRAWING, UNLESS AN "F" IS SHOWN IN THE NORTHEAST QUADRANT OF THE CODE. SHEETS ARE NUMBERED AWAY FROM THE MANUFACTURED HEAD, SHEET ONE BEING ADJACENT TO THE HEAD.

(4) FLUSH RIVETING OPERATIONS

D—DIMPLE SHEET 1	C—COUNTERSINK SHEET 1
D2—DIMPLE SHEET 1 & 2	DC—DIMPLE SHEET 1, SUB-COUNTERSINK SHEET 2
D3—DIMPLE SHEET 1, 2 & 3	D2C—DIMPLE SHEETS 1 & 2, SUB-COUNTERSINK SHEET 3
D4—DIMPLE SHEET 1, 2, 3 & 4	D3C—DIMPLE SHEETS 1, 2 & 3, SUBCOUNTERSINK SHEET 4

FASTENERS TORQUE VALUES

STRUCTURAL IDENTIFICATION

GENERAL

A threaded fastener is used to create a clamping force on one or more component parts. When this clamping force is created, there is a tensile stress set up in the body of the fastener. This is generally referred to as initial tension and causes elongation or stretch of the fastener. It is this stretch which maintains the clamping force. So that each fastener will carry its full share of the load, the clamping forces must be equally distributed.

Since torque may be defined as a force that tends to produce rotation, the amount of torque applied to a threaded fastener will govern the amount of initial stretch or clamping action of that fastener. This force (torque) can be measured by multiplying the length of the lever arm by the force applied at 90° to the axis of the lever. Through the use of this law, torque wrenches were developed.

Engineers have calculated the exact amount of torque that must be applied to threaded fasteners for each specific size, material type, and installation method. This information may be found in the following torque tables. It is self-evident that over-torquing or under-torquing a threaded fastener is a direct invitation for a structural failure.

TORQUE VALUES

All threaded parts except as noted, shall be installed in accordance with tables 2 thru 7, unless otherwise shown on the drawing. Lubrication shall not be used except on corrosion resistant steel and H-11 steel threaded parts, which shall be lubricated with MIL-T-5544 compounds to prevent seizure and galling. Specific torques on the engineering drawing are to be met dry, unless the lubricated condition is specified in the callout. Tightening shall be accomplished by rotating the nut if possible. Recessed head screws shall be free of burrs and roughness at recess edges.

Table 6 provides quick reference for torque values of fastener part numbers in the Sabreliner airplane. These torque values are also listed in the other torque tables; however, the fastener part number and tensile strength must first be obtained.

STRUCTURAL IDENTIFICATION (Continued)

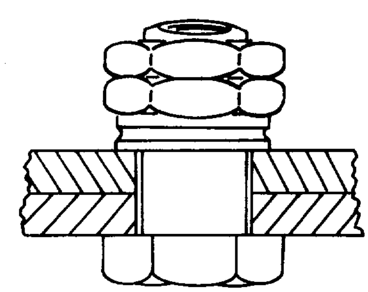
Table 1. Torque Values for FIC Klincher Locknuts

SIZE & THREAD	TORQUE INCHES—POUNDS	TORQUE FOOT—POUNDS
10-32	24-40 A	
1/4-28	95-125 B	
5/16-24	130-170 B	11-14
3/8-24	255-340	21-28
7/16-20	420-550	35-45
1/2-20	720-960	60-80
9/16-18	1080-1404	90-117
5/8-18	1536-2040	128-170
3/4-16	2700-2880	226-240
1-14	6480-6840	540-570

NOTES

A *To obtain values in foot-pounds, divide inch-pounds by 12.*

B *Recommend use of wrench graduated in inch-pounds for these fasteners.*



CAUTION

For proper locking action, the lock nuts must be assembled as above.

Table 2. Torque Values for Standard Bolts/Nuts 40,000-60,000 PSI and Over 90,000 PSI

BOLT STUD, OR SCREW SIZE D	STANDARD BOLTS, STUDS, AND SCREWS HAVING A TENSILE STRENGTH OF 40 — 60,000 PSI		HIGH STRENGTH BOLTS, STUDS, AND SCREWS HAVING A TENSILE STRENGTH OF 90,000 PSI AND OVER	
	SHEAR TYPE NUTS (IN.—OZ.) A B C	TENSION TYPE NUTS AND THREADED MACHINE PARTS A B C	SHEAR TYPE NUTS (IN.—OZ.) A B C	TENSION TYPE NUTS AND THREADED MACHINE PARTS A B C
0-80	5.0- 7.5	8.5- 13.0	7.5- 11.5	13.0- 19.0
1-64	9.0- 13.5	15.0- 22.5	13.5- 20.0	22.5- 33.5
1-72	10.0- 15.0	17.0- 25.5	15.5- 23.0	25.5- 38.5
2-56	15.0- 22.0	24.5- 37.0	22.0- 33.0	37.0- 55.0
2-64	16.5- 25.0	28.0- 41.5	25.0- 37.5	42.0- 62.5
3-48	21.0- 31.5	35.5- 53.0	32.0- 47.5	53.0- 79.0
3-56	24.0- 35.5	39.5- 59.0	35.5- 53.5	59.9- 89.0
4-40	31.0- 46.0	51.5- 77.0	46.5- 69.0	77.0-115.0
4-48	36.0- 53.5	60.0- 89.5	54.0- 80.5	90.0-134.5
6-32	58.5- 87.5	97.5-145.5	88.0-131.0	146.5-218.5
6-40	71.5-106.5	119.0-177.5	107.0-160.0	178.5-266.5

NOTES

A *To obtain values in inch-pounds, divide inch-ounce values by 16.*

B *High side of selected torque range should be approached whenever possible when it is necessary to tighten fastener from head side. Do not exceed maximum torque by more than 10% above high side of selected torque range listed in Table 3, unless otherwise shown on drawing.*

C *Maximum torque values are to be used only when materials and surfaces being fastened together have sufficient area, thickness, or strength to resist breaking, warping, or other damage.*
Example: No attempt should be made to reach maximum torque value when bolting through very thin sections of glass, metal, or plastic.

D *3/8-32 thru 3/8-24 size fasteners having an ultimate tensile strength of 40,000 to 60,000 psi shall be installed to torque values given in Table 4 for 125,000 to 140,000 psi fasteners with shear type nuts.*

Table 3. Torque Values for Standard Bolts/Nuts 125,000-140,000 PSI

BOLTS, STUDS, OR SCREW SIZE		ON STANDARD BOLTS, STUDS, AND SCREWS HAVING A TENSILE STRENGTH OF 125,000 — 140,000 PSI B C			
		SHEAR TYPE NUTS D E (AN320, AN363, OR EQUIVALENT)		TENSION-TYPE NUTS & THREADED MACHINE PARTS (AN310, AN365, NAS679A, NAS1291C, MS21043 OR EQUIVALENT)	
		IN. — LBS	FT — LBS	IN — LBS	FT—LBS
8-32	8-36	7-9		12-15	
10-24	10-32	12-15		20-25	
1/4-20		25-30	A	40-50	A
	1/4-28	30-40		50-70	
5/16-18		49-55	F	80-90	F
	5/16-24	60-85		100-140	
3/8-16		95-110		160-185	
	3/8-24	95-110		160-190	
7/16-14		140-155		235-255	20-21
	7/16-20	270-300		450-500	37-42
1/2-13		240-290	20-24	400-480	33-40
	1/2-20	290-410	24-34	480-690	40-59
9/16-12		300-420	25-35	500-700	42-58
	9/16-18	480-600	40-50	800-1,000	67-83
5/8-11		420-540	35-45	700-900	58-75
	5/8-18	660-780	55-65	1,100-1,300	92-108
3/4-10		700-950	58-79	1,150-1,600	96-133
	3/4-16	1,300-1,500	108-125	2,300-2,500	192-208
7/8-9		1,300-1,800	108-150	2,200-3,000	183-250
	7/8-14	1,500-1,800	125-150	2,500-3,000	208-250
1"-8		2,200-3,000	183-250	3,700-5,000	308-416
	1"-14	2,200-3,300	183-275	3,700-5,500	308-460
1-1/8-8		3,300-4,000	275-333	5,500-6,500	460-540
	1-1/8-12	3,000-4,200	250-350	5,000-7,000	416-580
1-1/4-8		4,000-5,000	333-416	6,500-8,000	540-670
	1-1/4-12	5,400-6,600	450-550	9,000-11,000	750-920

NOTES

A WHEN NUTS ARE TO BE SECURED TO FASTENER WITH COTTER PINS OR SAFETYWIRE, TIGHTEN NUT TO LOW SIDE OF SELECTED TORQUE RANGE, UNLESS OTHERWISE SHOWN ON DRAWING, AND IF NECESSARY CONTINUE TIGHTENING UNTIL NEXT SLOT ALIGNS WITH HOLE. NUTS SHALL NOT BE LOOSENED TO OBTAIN ALIGNMENT.

B WHEN NECESSARY TO TIGHTEN FASTENER FROM HEAD SIDE, HIGH SIDE OF SELECTED TORQUE RANGE SHOULD BE APPROACHED WHENEVER POSSIBLE, BUT IN NO CASE SHALL MAXIMUM TORQUE EXCEED 10% ABOVE HIGH SIDE OF SELECTED TORQUE RANGE LISTED IN TABLE 3, UNLESS OTHERWISE SHOWN ON DRAWING.

C FOR HEAT TREATED CORROSION RESISTANT STEEL NUTS, TORQUE VALUES SHOWN FOR "TENSION-TYPE" NUTS SHALL BE USED AND FOR NON-HEAT TREATED CORROSION RESISTANT STEEL NUTS, TORQUE VALUES FOR SHEAR TYPE NUTS SHALL BE USED.

D USE OF SHEAR TYPE NUTS REQUIRES USE OF TORQUE VALUES GIVEN FOR SHEAR TYPE NUTS.

E TO OBTAIN VALUES IN FOOT-POUNDS, DIVIDE INCH-POUND VALUES BY 12.

F RECOMMEND USE OF WRENCH GRADUATED IN INCH-POUNDS FOR THESE FASTENERS.

Table 4. Torque Values for Bolts/Nuts 140,000 — 160,000 PSI and Over 160,000 PSI

BOLTS, B STUDS, G OR SCREW H SIZE		ON BOLTS, STUDS, AND SCREWS HAVING A TENSILE STRENGTH OF 140,000-160,000 PSI C		ON HIGH STRENGTH BOLTS, STUDS, AND SCREWS HAVING A STRENGTH OF 160,000 PSI AND OVER	
		ANY NUT, C EXCEPT SHEAR TYPE D (NAS1291, MS21042 OR EQUIVALENT)		ANY NUT, EXCEPT SHEAR-TYPE D (NAS1291, MS21042) (COMMERCIAL NUTS, E.G., 42 FW, FN26, FN926, H20) ETC., UNLESS OTHERWISE SPECIFIED ON THE DRAWING	
		IN. — LBS	FT — LBS	IN — LBS	FT—LBS
8-32	8-36	14-17	A E F	15-18	A E F
10-24	10-32	23-30		25-35	
1/4-20		45-59		50-68	
	1/4-28	60-80		70-90	
5/16-18		85-117		90-144	
	5/16-24	120-172		140-203	
3/8-16		173-217		185-248	
	3/8-24	175-271		190-351	
7/16-14		245-342	20-29	259-423	21-36
	7/16-20	475-628	40-52	500-756	42-63
1/2-13		440-636	37-53	480-792	40-66
	1/2-20	585-810	49-70	690-990	58-63
9/16-12		600-845	50-70	700-990	58-63
	9/16-18	900-1,220	75-102	1,000-1,440	83-120
5/8-11		800-1,125	67-94	900-1,350	75-112
	5/8-18	1,200-1,730	100-144	1,300-2,160	108-180
3/4-10		1,380-1,925	115-160	1,600-2,250	133-168
	3/4-16	2,400-3,500	200-202	2,500-4,500	208-375
7/8-9		2,600-3,570	216-298	3,000-4,140	250-345
	7/8-14	2,750-4,650	229-388	3,000-6,300	250-525
1"-8		4,350-5,920	362-495	5,000-6,840	416-570
	1"-14	4,600-7,250	384-605	5,500-9,000	460-750
1-1/8-8		6,000-8,650	500-720	6,500-10,800	540-900
	1-1/8-12	6,000-10,250	500-855	7,000-13,500	580-1,120
1-1/4-8		7,250-11,000	605-916	8,000-14,000	666-1,160
	1-1/4-12	10,000-16,750	833-1,395	11,000-22,500	920-1,860

NOTES

A WHEN NUTS ARE TO BE SECURED TO FASTENER WITH COTTER PINS OR SAFETYWIRE, TIGHTEN NUT TO LOW SIDE OF SELECTED TORQUE RANGE, UNLESS OTHERWISE SHOWN ON DRAWING, AND IF NECESSARY CONTINUE TIGHTENING UNTIL NEXT SLOT ALIGNS WITH HOLE. NUTS SHALL NOT BE LOOSENED TO OBTAIN ALIGNMENT.

B WHEN NECESSARY TO TIGHTEN FASTENER FROM HEAD SIDE, HIGH SIDE OF SELECTED TORQUE RANGE SHOULD BE APPROACHED WHENEVER POSSIBLE, BUT IN NO CASE SHALL MAX TORQUE EXCEED TEN PERCENT ABOVE HIGH SIDE OF SELECTED TORQUE RANGE LISTED IN TABLE 3, UNLESS OTHERWISE SHOWN ON DRAWING.

C NAS1292 AND NAS1322 SERIES SHEAR PINS USED WITH NAS1237 AND NAS1288 NUTS SHALL BE CONSIDERED IN THIS CATEGORY AND TIGHTENED TO TORQUE ACCORDINGLY. IN AREAS WHERE 8-32 AND 10-32 SIZE NUTS ARE USED WITH NAS1292 AND NAS1322 SHEAR PINS AND ARE INACCESSIBLE FOR TORQUE READING TOOLS, TORQUE MAY BE SIMULATED BY MEANS OF A BENCH TEST TO GAIN A FEEL FOR AMOUNT OF TORQUE REQUIRED AND APPLY THIS WITH REGULAR WRENCHES TO ACTUAL APPLICATION.

HI-LOK SERIES SHEAR PINS HL18, HL19, HL30, AND HL31 WHEN USED WITH MS21042, MS21043, OR EQUIVALENT NUTS SHALL BE TIGHTENED TO TORQUE VALUE SHOWN IN TABLE 4 FOR BOLTS OF 140,000 TO 160,000 PSI TENSILE STRENGTH.

D USE OF SHEAR TYPE NUTS REQUIRES USE OF TORQUE VALUES GIVEN FOR SHEAR TYPE NUTS.

E TO OBTAIN VALUES IN FOOT-POUNDS, DIVIDE INCH-POUND VALUES BY 12.

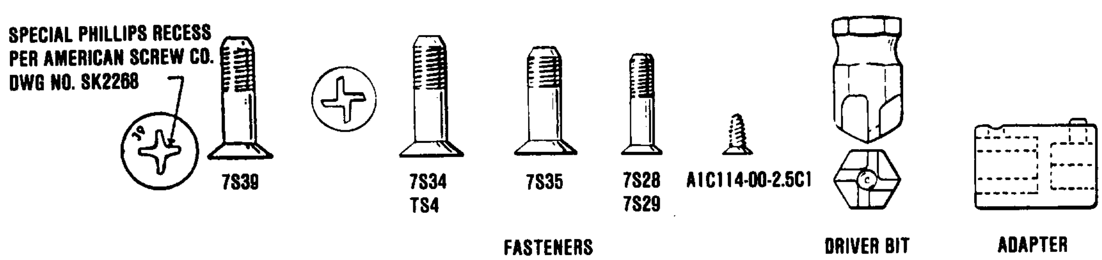
F RECOMMEND USE OF WRENCH GRADUATED IN INCH-POUNDS FOR THESE FASTENERS.

G WHEN TIGHTENING ULTRA HIGH TENSILE BOLTS TO VALUES GREATER THAN INDICATED IN TABLE, OR TO SPECIAL DRAWING TORQUE CALLOUTS, CARE MUST BE TAKEN TO USE HEAVY ENOUGH SOCKETS TO PREVENT SOCKET BREAKAGE THAT MAY RESULT IN HEAVY DAMAGE TO ADJACENT STRUCTURE.

H 7S29, 7S36, 7S37 REDUCED HEAD AND RECESS SERIES SCREWS SHALL BE TIGHTENED TO TORQUE VALUES OF NEXT LOWER THREAD SIZE THAN THAT OF SCREW PART NUMBER CALLOUT. EXAMPLE: 7S37J6A12 SCREW REQUIRES 140-203 INCH-POUNDS TORQUE.

Table 5. Torque Values for Torque-Set Fasteners

MACHINE SCREWS			TORQUE INCH-POUNDS (FOR TENSION-TYPE NUT, FULL, THD LENGTH)	TORQ-SET SCREWDRIVER	SQUARE DRIVE ADAPTER
COML NO.	SABRELINER STD	SIZE			
T TS3	7S34-3 7S35-3 7S29-10 TS39-3	10-32	25-35	EX-170-10	SC-108
TS4	7S28-4 7S34-4 7S35-4 7S29-416 7S39-4	1/4-28	70-90	EX-170-1/4	SC-114
TS5	7S28-5 7S34-5 7S35-5 7S29-516 7S39-5	5/16-24	140-203	EX-170-5/16	SC-314
TS6	7S28-6 7S34-6 6S35-6 7S29-616 7S39-6	3/8-24	190-351	EX-170-3/8	SC-314
TS7	7S28-7 7S34-7 7S35-7 7S29-716 7S39-7	7/16-20	500-756	EX-170-7/16	SC-314
TS8	7S28-8 7S34-8 7S35-8 7S29-816 7S39-8	1/2-20	690-990	EX-170-1/2	HE-3320
TS9	7S28-9 7S34-9 7S35-9 7S29-916 7S39-9	9/16-18	1,000-1,440	EX-170-9/16	HE-3320
SELF-TAPPING SCREW COML NO. AIC114-00-2.5C1		6-32		EX-170-6	SC-108



NOTES

- ***This is a torque-set data table for 100° flush screws (heated to 160,000-180,000 psi). Torque values apply to all nuts except shear type. Higher values should be used when torquing heads of screws; however, these values should not be exceeded by more than 10%.***
- ***7S35 fastener has shorter threaded length to save weight and is used with low-profile nuts.***
- ***For 7S29 screws, use torque values and drive-bit size of next size smaller fastener.***
- ***AIC114-00-2.5C1 screw is used to plug sealant injection holes.***

S265-3-51A

Table 6. Torque Values for Screw Fasteners

PART NUMBER	TORQUE (INCH-POUNDS) ANY NUT EXCEPT SHEAR TYPE	TORQUE SET SCREWDRIVER	TORQUE SET ADAPTER
75,000 PSI			
7S13-632 7S14-632 A	7-11	N/A	N/A
7S14-832 A 7S16-8	9-12	N/A	N/A
7S13-1032 7S14-1032 A 7S16-1032	16-20	N/A	N/A
125,000-140,000 PSI			
7S15-8	12-15	N/A	N/A
7S15-10	20-25	N/A	N/A
7S33 A3 A LD 112-0002-03XX B LD112-0003-03XX B 7S35 A3 A LD112-0035-03XX B LD112-0036-03XX B 7S39-3	20-25	EX170-10	SC-108 or SC-308
7S15-416 7S33 A4 A LD112-0002-04XX B LD112-0003-04XX B 7S35 A4 A LD112-0035-04XX B LD112-0036-04XX A 7S39-4	50-70	EX170-1/4	SC-114, SC-314, or SC-514
7S33 A5 A LD112-0002-05XX B LD112-0003-05XX B 7S35 A5 A LD112-0035-05XX B LD112-0036-05XX B 7S39-5 7S39-6	100-140 160-190	EX170-5/16 EX170-3/8	SC-114, SC-314, or SC-514
160,000-180,000 PSI			
NAS 1100E06 7S 37-06 A LD112-0033-01XX B LD112-0034-01XX B	5-8	EX170-6	SC-108 or SC-308
NAS 1100E-08 7S37-08 A LD112-0033-02XX B LD112-0034-02XX B	15-18	EX170-8	SC-108 or SC-308

Table 6. Torque Values for Screw Fasteners (Cont'd)

PART NUMBER	TORQUE (INCH-POUNDS) ANY NUT EXCEPT SHEAR TYPE	TORQUE SET SCREWDRIVER	TORQUE SET ADAPTER
	160,000-180,000 PSI (Cont'd)		
NAS 1100E3 7S 32-3 A LD112-0028-01XX B 7S 33-3 A LD112-0006-03XX B LD112-0007-03XX B 7S 34-3 A LD112-0021-01XX B LD112-0022-01XX B 7S 35-3 A LD112-0039-03XX B LD112-0040-03XX B 7S 36-3 A LD112-0015-01XX B 7S 37-3 A LD112-0033-03XX B LD112-0034-03XX B	25-35	EX170-10	SC-108 or SC-308
7S 29-416 7S 32-4 A LD112-0028-02XX B 7S 33-4 A LD112-0006-04XX B LD112-0007-04XX B 7S 34-4 A LD112-0021-02XX B LD112-0022-02XX B 7S 35-4 A LD112-0039-04XX B LD112-0040-04XX B 7S 37-4 A LD112-0033-04XX B LD112-0034-04XX B	70-90	EX170-1/4	SC-114, SC-314, or SC-514
7S 33-5 A LD112-0006-05XX B LD112-0007-05XX B 7S 34-5 A LD112-0021-03XX B LD112-0022-03XX B 7S 35-5 A LD112-0039-05XX B LD112-0040-05XX B	140-203	EX 170-5/16	SC-114, SC-314, or SC-514
7S 29-616	190-351	EX 170-3/8	SC-314
7S 28-5 A LD112-0016-02XX B	140-203	EX 170-5/16	SC-314
7S 28-6 LD112-0016-03XX B	190-351	EX 170-3/8	SC-314
7S 28-10 A LD112-0016-07XX B	1300-2160	EX 170-5/8	HE-3320

NOTES

- TORQUE RANGE FOR 7S39 REDUCED HEAD SCREWS SHALL BE THAT USED FOR TENSION TYPE FASTENERS OF THE 125,000-140,000 PSI HEAT TREATMENT LEVEL. (REFER TO TABLE 3.)

A SEE ALTERNATE PARTS LIST.

B XX GRIP LENGTH IN 1/16 IN.

- 7S29, 7S36, 7S37 REDUCED HEAD AND RECESSED SERIES SCREWS SHALL BE TORQUED TO VALUES OF NEXT LOWER THREAD SIZE THAN THAT OF SCREW PART NUMBER CALLOUT. EXAMPLE: 7S37J6A12 SCREW REQUIRES 140-203 IN.—LBS TORQUE. (REFER TO TABLE 4.)

STRUCTURAL IDENTIFICATION (Continued)

Table 7 provides alternate part numbers for Rockwell International 7S special series screws. These part numbers are also listed in table 6 by size, tensile strength, and torque value.

Table 7. **Alternate Part Numbers**

PART NUMBER	ALTERNATE PART NUMBER	
7S14-632	NAS1100E06	
7S14-832	NAS1100E07	
7S14-1032	NAS1100E3	
7S32-3	LD112-0028-01XX	
7S32-4	LD112-0028-02XX	
7S33-3	LD112-0006-03XX	LD112-0007-03XX
7S33A3 A	LD112-0002-03XX	LD112-0003-03XX
7S33-4	LD112-0006-04XX	LD112-0007-04XX
7S33A4 A	LD112-0002-04XX	LD112-0003-04XX
7S33-5	LD112-0006-05XX	LD112-0007-05XX
7S33A5 A	LD112-0002-05XX	LD112-0003-05XX
7S34-3	LD112-0021-01XX	LD112-0022-01XX
7S34-4	LD112-0021-02XX	LD112-0022-02XX
7S34-5	LD112-0021-03XX	LD112-0022-03XX
7S35-3	LD112-0039-03XX	LD112-0040-03XX
7S35A3 A	LD112-0035-03XX	LD112-0036-03XX
7S35-4	LD112-0039-04XX	LD112-0040-04XX
7S35A4 A	LD112-0035-04XX	LD112-0036-04XX
7S35-5	LD112-0039-05XX	LD112-0040-05XX
7S35A5	LD112-0035-05XX	LD112-0036-05XX
7S36-3	LD112-0015-01XX	
7S37-06	LD112-0033-01XX	LD112-0034-01XX
7S37-08	LD112-0033-02XX	LD112-0034-02XX
7S37-3	LD112-0033-03XX	LD112-0034-03XX
7S37-4	LD112-0033-04XX	LD112-0034-04XX
7S28-5	LD112-0016-02XX	
7S28-6	LD112-0016-03XX	
7S28-10	LD112-0016-07XX	

NOTE

A THE "A" INDICATES A286 STEEL, HEAT TREATMENT OF 140,000 PSI MINIMUM THE DASH INDICATES 4130 STEEL, HEAT TREATMENT OF 160,000-180,000 PSI MINIMUM DO NOT SUBSTITUTE AN A286 STEEL SCREW FOR A 4130 STEEL SCREW.

RIVETS

STRUCTURAL IDENTIFICATION

GENERAL

Common and special types are used in the Sabreliner airplane. Refer to the applicable table or figure for more specific information on installation and usage. Standard AN, MS, and NAS rivets are not included. (See figures 1 thru 13, and refer to tables 1 thru 11.)

Table 1. Rivet Hole Size

	HOLE SIZE								
		BLIND FASTENERS						DRIVE PIN RIVET (DEUTSCH)	
		FINAL HOLE SIZE							
			PULL						
			CHERRY & OLYMPIC		HUCK				
FASTENER SIZE	CONVENTIONAL RIVET [A]	EXPLOSIVE (DUPONT)	STANDARD RIVET	OVERSIZE RIVET	BL SERIES BLIND LOCK BOLT	OS & OSR SERIES RIVET	JO-BOLT	PILOT-DRILL BEFORE DIMPLING	FINAL HOLE SIZE
3/32	0.097-0.100 (NO. 40)								
1/8	0.1290-0.1305 (NO. 30)	0.135-0.139 (NO. 29)	0.128-0.132 (NO. 30)	0.137-0.141 (NO. 29)				0.097-0.100 (NO. 40)	0.1255-0.0.1265
5/32	0.160-0.162 (NO. 21)	0.172-0.176 (NO. 17)	0.160-0.164 (NO. 20)	0.177-0.181 (NO. 16)			0.164-0.166	0.128-0.132 (NO. 30)	0.1565-0.1575
3/16	0.192-0.194 (NO. 11)	0.203-0.207 (NO. 6)	0.192-0.196 (NO. 10)	0.206-0.210 (NO. 5)			0.199-0.202	0.172-0.176 (NO. 17)	0.191-0.193
1/4	0.256-0.261 (F)		0.256-0.261 (F)		0.260-0.265 (G)	0.271-0.276 (I)	0.260-0.263	0.227-0.231 (NO. 1)	0.259-0.262
3/8							0.312-0.315	0.2802-0.2852 (9/32)	0.315-0.318
							0.375-0.379		0.385-0.388

NOTES

[A] HOLES AFTER DIMPLING MUST NOT EXCEED THE NOMINAL DRILL SIZE BY MORE THAN 15%.

- HOLES TO BE DIMPLED FOR EXPLOSIVE AND PULL FASTENERS MUST BE PILOT-DRILLED USING NOMINAL DRILL SIZE GIVEN FOR CONVENTIONAL RIVETS, DIMPLED, AND REDRILLED TO SIZE.
- IF HOLE SIZE EXCEEDS LIMITS GIVEN FOR STANDARD RIVET BUT IS WITHIN LIMITS GIVEN FOR OVERSIZE RIVET, USE THE OVERSIZE RIVET.

Table 2. Conventional Rivet Identification and Applications

RIVET MATERIALS	AL ALLOY 2117-T4	AL ALLOY 2024-T4	AL ALLOY 5056	AL ALLOY 1100-F	MILD STEEL CAD-PLATED	MONEL	A-286 CRES
HEAD MARKINGS	Dimple	Raised Double Dash	Raised Cross	Plain	Recessed Triangle	Dimples Plain	Raised TIT
UNIVERSAL	MS20470AD	MS20470DD	MS20470B	MS20470A		NAS508M	NAS1198
FLUSH – LARGE HEAD	MS20426AD	MS20426DD	MS20426B	MS20426A	AN427	AN427M	NAS1199
FLUSH – SMALL HEAD	NAS1097AD	NAS1097DD	NAS1097B				NAS1200
ROUND					AN435		
AVAILABLE SIZES	3/32, 1/8 & 5/32 Dia	3/16 Dia & Over	No Limit	No Limit	5/16 Dia Max	3/16 Dia Max	3/16 Dia Max
MAXIMUM TEMPERATURE FOR STRENGTH	93.3°C (200°F)	93.3°C (200°F)	93.3°C (200°F)		149°C (500°F)	426.7°C (800°F)	649°C (1200°F)

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Table 2. Conventional Rivet Identification and Applications (Cont'd)

RIVET MATERIALS	AL ALLOY 2117-T4 (AD)	AL ALLOY 2024-T4 (DD)	AL ALLOY 5056 (B)	AL ALLOY 1100-F (A)	MILD STEEL CAD-PLATED	MONEL (M)	A-286 CRES [A]
AL ALLOY TO AL ALLOY	PREFERRED	PREFERRED	PERMISSIBLE BUT UNDESIRABLE	[B]			
AL ALLOY TO CAD-PLATED STEEL	[C]	[C]			PREFERRED [D]	PERMISSIBLE BUT UNDESIRABLE	
AL ALLOY TO CRES	[C]	[C]			PREFERRED [D]	PERMISSIBLE BUT UNDESIRABLE	
AL ALLOY TO TITANIUM	[C]	[C]			PREFERRED [D]	PERMISSIBLE BUT UNDESIRABLE	
CAD-PLATED STEEL TO CAD-PLATED STEEL	PERMISSIBLE BUT UNDESIRABLE	PERMISSIBLE BUT UNDESIRABLE			PREFERRED [D]	PERMISSIBLE BUT UNDESIRABLE	
CAD-PLATED STEEL TO CRES	PERMISSIBLE BUT UNDESIRABLE	PERMISSIBLE BUT UNDESIRABLE			PREFERRED [D]	PERMISSIBLE BUT UNDESIRABLE	PERMISSIBLE BUT UNDESIRABLE
CAD-PLATED STEEL TO TITANIUM	PERMISSIBLE BUT UNDESIRABLE	PERMISSIBLE BUT UNDESIRABLE			PREFERRED [D]	PERMISSIBLE BUT UNDESIRABLE	
CRES TO CRES						PREFERRED	PREFERRED
CRES TO TITANIUM						PREFERRED	PERMISSIBLE BUT UNDESIRABLE
TITANIUM TO TITANIUM						PREFERRED	PERMISSIBLE BUT UNDESIRABLE
MAGNESIUM ALLOY TO AL ALLOY			PREFERRED				
MAGNESIUM ALLOY TO CAD-PLATED STEEL			PREFERRED				
MAGNESIUM ALLOY TO MAGNESIUM ALLOY			PREFERRED				
SOFT MATERIAL (PLASTIC, FABRIC, ETC)	ACCEPTABLE		PERMISSIBLE BUT UNDESIRABLE	PREFERRED			

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NOTES

- SHADED AREAS INDICATE COMBINATIONS THAT ARE NOT PERMISSIBLE BECAUSE OF INTERMATERIAL ELECTROLYTIC ACTION OR BECAUSE OF SOME MECHANICAL LIMITATION SUCH AS RELATIVE MATERIAL HARDNESSES.

[A] A286 RIVETS ARE MORE DIFFICULT TO DRIVE AND SHOULD BE USED ONLY IN PREFERENCE TO MONEL WHEN HIGHER SHEAR STRENGTH IS A NECESSITY.

[B] MAY BE USED FOR WELDING, WHERE EXTRA SOFTNESS IS REQUIRED, OR FOR PLUGGING HOLES.

[C] MAY BE USED, BUT MUST NOT BE USED TO REPLACE A HIGHER STRENGTH RIVET.

[D] PREFERRED FOR ELECTROLYTIC REASONS, BUT MUST NOT BE USED TO REPLACE MONEL OR CRES RIVETS.

STRUCTURAL IDENTIFICATION (Continued)

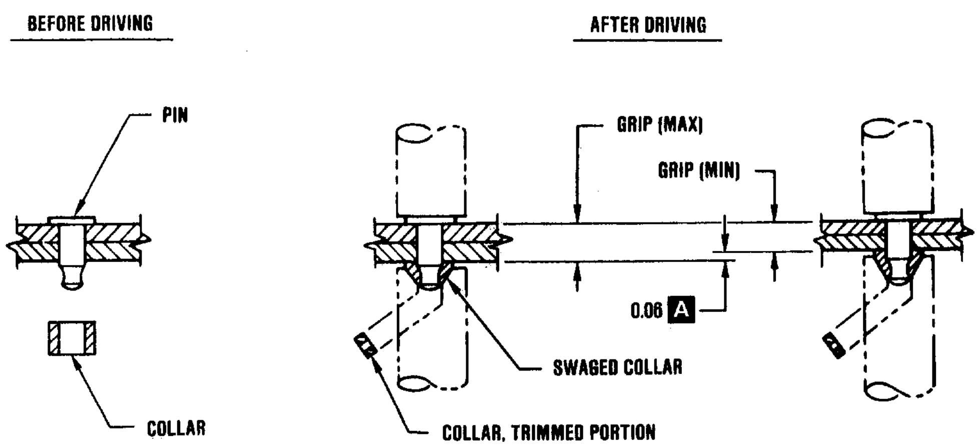
HIGH SHEAR RIVETS

The Hi-Shear rivet is a permanent fastener used to resist shear load. The rivet consists of two pieces, a headed pin having an annular grooved shank, and a tubular collar.

Figure 1 shows the Hi-Shear rivet assembly before and after driving. When assembled, the pin retains its original shape and the collar is swaged to the shape of the groove in the pin and to the shape of the conical rivet set, with the excess portion of the collar trimmed and ejected automatically.

The rivet is identified by separate part numbers consisting of one number for the pin and another number for the collar. (See table 4.)

Since the pin does not swell during assembly, continuous support is not needed. Thus, hollow sections that are sufficiently rigid to withstand the axial pressure of the collar upsetting operation may be successfully riveted.

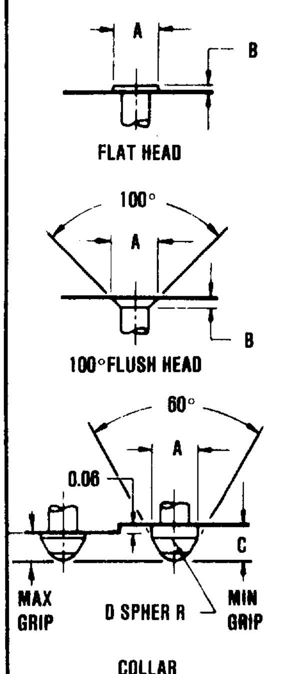


NOTE

A GRIP VARIATION FOR ANY ONE LENGTH OF RIVET.

Hi-Shear Rivet Assembly
Figure 1

Table 3. Hi-Shear Rivet, Head and Collar Dimensions



DESCRIPTION		SHANK DIAMETER					
		3/16	1/4	5/16	3/8	7/16	1/2
FLAT HEAD / 100°FLUSH HEAD / COLLAR	A	0.31	0.41	0.50	0.60	0.68	0.77
	B	0.06	0.07	0.08	0.09	0.10	0.12
	C	0.23	0.28	0.34	0.41	0.47	0.53
	D	0.12	0.16	0.20	0.25	0.30	0.34

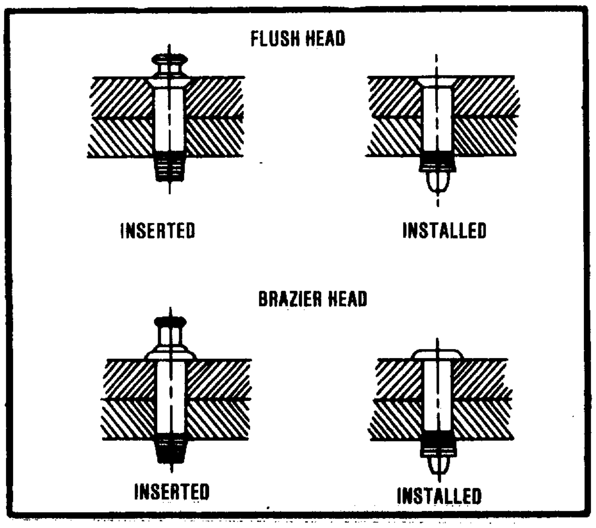
STRUCTURAL IDENTIFICATION (Continued)

DRIVE PIN RIVETS

Drive pin rivets are a mechanically expanding blind rivet consisting of a pre-assembled pin and sleeve. The pin is driven into the sleeve, thereby expanding the sleeve to form a blind pin. An integral locking ring in the manufactured head is simultaneously peened over to lock the pin in the sleeve as shown in figure 2.

Deutsch Drive Pin Rivets

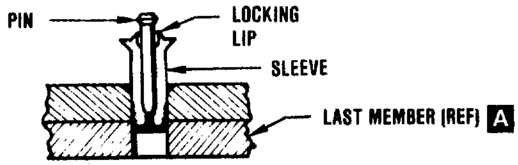
See figures 3 and 4.



Drive Pin Rivet
Figure 2

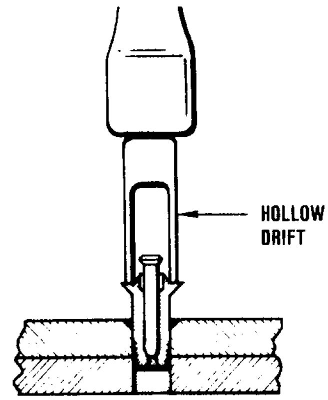
NOTE

A TOTAL THICKNESS OF MATERIAL BEING JOINED SHOULD BE MEASURED TO DETERMINE CORRECT LENGTH RIVET TO USE. IF MEASUREMENT SHOWS A BORDERLINE CASE BETWEEN TWO DIFFERENT LENGTHS, ALWAYS USE SHORTER LENGTH RIVET. DIMPLING TOOLS FOR HI-SHEAR RIVETS MAY BE USED FOR DEUTSCH BLIND RIVETS.

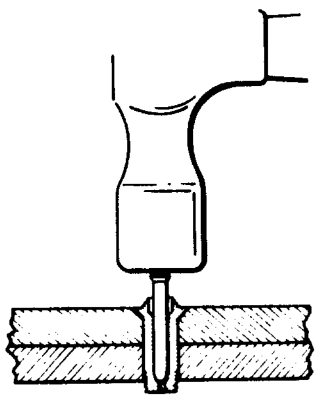


1 Select proper length rivet (refer to note **A**) and place in hole.

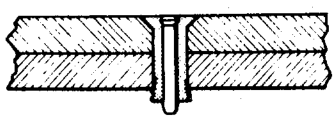
FASTENER SIZE—INCH	MIN THICKNESS OF LAST MEMBER **A**
3/16	0.125
1/4	0.188
5/16	0.250



2 Use a hollow drift that will chear locking lip. do not drive Deutsch drive pin blind rivets into tight holes by hammering on pin.



3 Rivets may be driven with air gun or hammer.



4 After pin has been seated in recess, smooth out the locking lip with a rotary or rolling action of the driving tool. If shaving is necessary for flushness, make certain that locking lip is not cut away to extent that lock is damaged or destroyed.

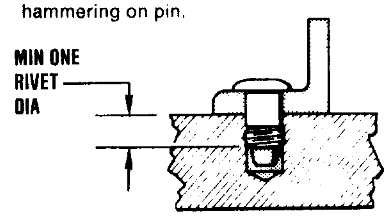
NOTE

B CODING FOR SELECTION OF PROPER FASTENERS
6950 DESIGNATES FLUSH HEAD.
6951 DESIGNATES PROTRUDING BRAZIER HEAD.
FIRST LETTER INDICATES SLEEVE MATERIAL.
S—STEEL
FIRST DASH NUMBER INDICATES RIVET DIAMETER IN 1/32 NDS.
SECOND DASH NUMBER INDICATES NOMINAL GRIP IN 1/16ths.

EXAMPLE:
6950-S-06-10 FLUSH HEAD—CRES—3/16 DIA—5/8 NOMINAL GRIP

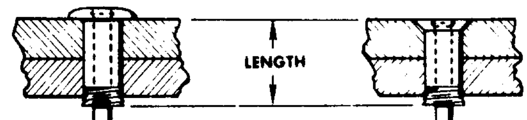
FINAL HOLE SIZES

RIVET SIZE	DIAMETER	REAM
3/16	0.1915	0.191-0.193
1/4	0.260	0.259-0.262
5/16	0.316	0.315-0.318
3/8	0.386	0.385-0.388



NOTE

WHEN RIVET IS INSTALLED IN A BURIED HOLE, AT LEAST ONE TIMES RIVET DIAMETER (INCLUDING LOCKING RINGS) MUST EXTEND INTO HOLE.



LENGTH AND GRIP RANGE CHART

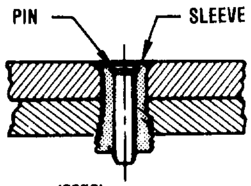
DASH NO.	NOMINAL GRIP	GRIP RANGE	LENGTH 3/16 DIA	LENGTH 1/4 DIA	LENGTH 5/16 DIA	LENGTH 3/8 DIA
-3	3/16	0.166—0.227	0.233			
-4	1/4	0.227-0.290	0.295	0.315	0.329	
-5	5/16	0.290-0.353	0.357	0.379	0.391	
-6	3/8	0.353-0.415	0.420	0.437	0.453	0.468
-7	7/16	0.415-0.478	0.482	0.500	0.516	0.530
-8	1/2	0.478-0.540	0.545	0.562	0.578	0.593
-9	9/16	0.540-0.603	0.607	0.625	0.641	0.656
-10	5/8	0.603-0.665	0.670	0.687	0.703	0.718
-11	11/16	0.665-0.728	0.732	0.749	0.766	0.780
-12	3/4	0.728-0.790	0.795	0.817	0.828	0.843
-13	13/16	0.790-0.853	0.857	0.877	0.891	0.905
-14	7/8	0.853-0.915	0.920	0.940	0.953	0.968
-15	15/16	0.915-0.978	0.982	1.000	1.016	1.030
-16	1.	0.978-1.040	1.045	1.062	1.078	1.093

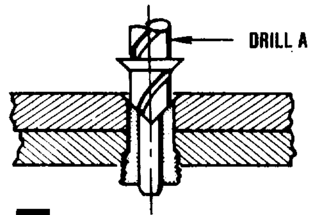
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Deutsch Drive Pin Rivets — Installation
Figure 3

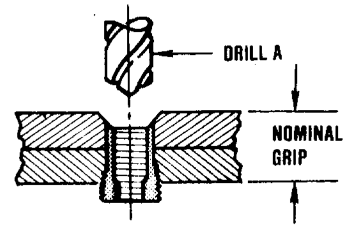
NOTE

DIMENSIONS ARE IN INCHES.

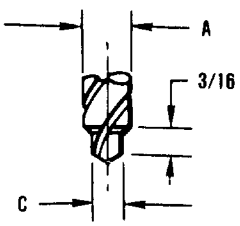


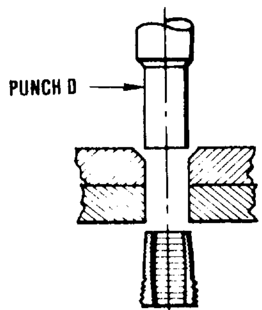


1 DRILL RIVET PIN HEAD OFF, USING DRILL SIZE A.



2 DRILL SLEEVE, USING DRILL SIZE A. DRILL TO NOMINAL GRIP DEPTH ONLY.





3 DRIVE REMAINDER OF SLEEEVE THROUGH.

DEUTSCH RIVET DASH NO.	DRILL SIZE A	PIN SIZE C	PUNCH SIZE D
-06 (3/16)	NO. 21 (0.1590)	0.1215	5/32
-08 (1/4)	NO. 1 (0.2280)	0.1625	7/32
-010 (5/16)	9/32 (0.2812)	0.1975	1/4
-012 (3/8)	NO. 5 (0.3480)	0.2425	11/32
-16 (1/2)	15/32 (0.4687)	0.3235	7/16

PROCEDURE FOR REMOVAL WHERE RIVET DOES NOT EXTEND THROUGH MATERIAL

1 Drill out rivet pin about half the depth, using recommended drill size.

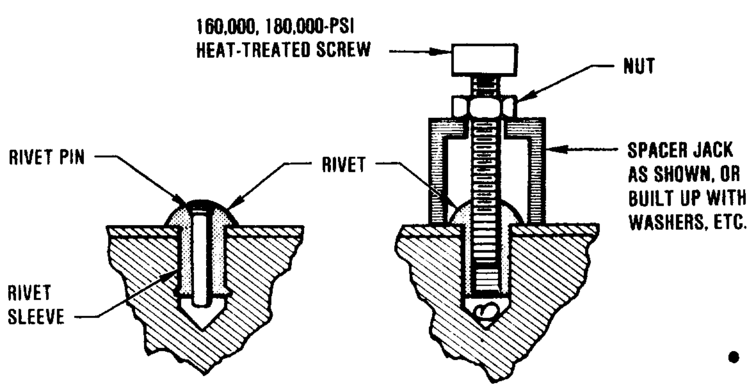
2 Tap sleeve, using recommended tap size. **A**

3 Drill out remainder of pin.

4 Insert Allen-head screw through spacer into tapped sleeve, and tighten nut.

5 Continue tightening nut until rivet sleeve is removed from work.

6 Hole is re-usable with same size rivet.



RIVET DIA (INCHES)	DRILL SIZE	SCREW AND TAP SIZE
3/16	29	8-32
1/4	19	10-32
5/16	3	1/4-28
3/8	I	5/16-24
7/16	Q	3/8-24
1/2	25/64	7/16-20

NOTES

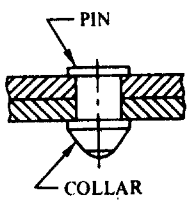
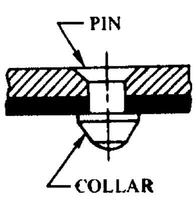
- USE MINIMUM OF 1-1/2 TIMES SCREW DIAMETER THREAD ENGAGEMENT IN RIVET SLEEVE.

A IF RIVET SLEEVE ROTATES DURING TAPPING OPERATION, USE SLIGHTLY LARGER DRILL FOR STEP **1**, PROVIDING LESS CUTTING EFFORT OF TAP.

S265-3-57

Deutsch Drive Pin Rivet — Removal
Figure 4

Table 4. Hi-Shear Rivet Selection

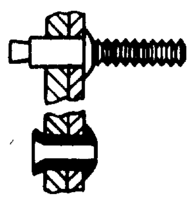
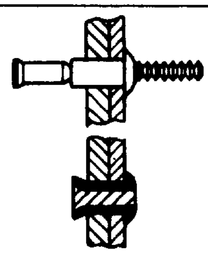
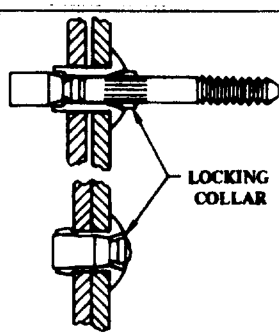
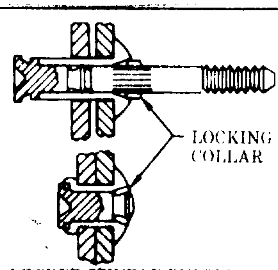
TYPE	BASIC PART NUMBER PIN	BASIC PART NUMBER COLLAR	USING DIVISION	SIZE RANGE (DIA)	MATERIAL & FINISH PIN	MATERIAL & FINISH COLLAR	APPLICATION MAX TEMP	APPLICATION SHEAR STRENGTH
 PROTRUDING HEAD HI -SHEAR RIVET	NAS1054	NAS528	H,L,S	1/8 TO 3/8	ALLOY STEEL CAD PL	2024- T4 AL ALLOY ANODIZE	250°F	95 KSI
			M	3/16 TO 3/8				
	NAS1806 THRU NAS1816	NAS528	M	3/16 TO 1/2	4–4 Ti 6–4 Ti NONE	2024 T4 AL ALLOY ANODIZE	250°F	95 KSI
	HE121-0007	HS60	H	1/8 TO 3/8	302 CRES PASS	321 CRES PASS	800°F	75 KSI
		HS60M				MONEL DYED		
	HS68	HS60M	M	3/16 TO 3/8	431 CRES PASS	MONEL DYED	800°F	125 KSI
	HE121–0008		H	1/8 TO 3/8				
	HS92	HS60M	M	5/32	A - 286 CRES PASS	MONEL DYED	800°F	95 KSI
	HE121 0026		H	1/8 TO 3/8				
	HS92	HS90	M	5/32	A -286 CRES PASS	A - 286 CRES PASS	1200°F	95 KSI
	HE121–0026		H	1/8 TO 3/8				
	NAS529	NAS528	M	7/16 TO 5/8	ALLOY STEEL CAD PL	2024 - T4 AL ALLOY ANODIZE	250°F	95 KSI
 100° FLUSH HEAD HI SHEAR RIVET	NAS1055	NAS528	H,L,S	1/8 TO 3/8	ALLOY STEEL CAD PL	2024 T4 AL ALLOY ANODIZE	250°F	95 KSI
			M	3/16 TO 3/8				
	NAS1906 THRU NAS1916	NAS528	M	3/16 TO 1/2	4-4 Ti 6-4 Ti NONE	2024- T4 AL ALLOY ANODIZE	250°F	95 KSI
	HS67	HS60M	M	3/16 TO 3/8	431 CRES PASS	MONEL DYED	800°F	125 KSI
	HE121 -0023		H	1/8 TO 5/8				
	HS91	HS60M	M	5/32	A - 286 CRES PASS	MONEL DYED	800°F	95 KSI
	HE121 -0025		H	1/8 TO 3/8				
	HS91	HS90	M	5/32	A 286 CRES PASS	A 286 CRES PASS	1200°F	95 KSI
	HE121 - 0025		H	1/8 TO 3/8				
	NAS525	NAS528	M	7/16 TO 5/8	ALLOY STEEL CAD PL	2024 T4 AL ALLOY ANODIZE	250°F	95 KSI

STRUCTURAL IDENTIFICATION (Continued)

BLIND PULL RIVETS

Blind pull rivets are the most commonly used type of blind fastener. The rivet is expanded mechanically by pulling the stem in to the final position. The locked spindle type provides for flush break-off and positive retention of the stem by means of a locking ring in the head. (See table 5.)

Table 5. Pull Rivet Selection

TYPE	HEAD STYLE	BASIC PART NUMBER	MATERIAL AND FINISH	MAX SERVICE TEMP F	CHARACTERISTICS
 PULL-THRU	PROTRUDING HEAD	MS20604	5056 AL ALY 2117 T4 AL ALY MONEL (CAD PL) MONEL (BARE)	250 250 400 800	Nonstructural. Pull-thru. Fair clamp-up with good hole filling characteristics. Used for nonstructural applications such as nameplate attachment where high shear strength of self-plugging type is not required. Subject to usage limitations imposed by using Division and as outlined in MS33557.
	100 DEG FLUSH HEAD	MS20605			
 SELF-PLUGGING	PROTRUDING HEAD	MS20600	5056 AL ALY 2117 T4 AL ALY MONEL (CAD PL) MONEL (BARE)	250 250 400 800	Structural. Self-plugging. Stem must be trimmed. Clamping ability even with thin sheets is mediocre. Not to be used where fluid-tight joints are required. Subject to usage limitations outlined in MS33522.
	100 DEG FLUSH HEAD	MS20601			
 LOCKED SPINDLE	PROTRUDING HEAD	NAS1398	5056 AL ALY 2017-T4 AL ALY MONEL (CAD PL) MONEL (SIL PL) A-286 CRES	250 250 400 800 1200	Structural. Locked spindle. Automatic stem break-off. Good clamp up and hole-fill. Used to provide increased joint reliability under critical loading conditions such as fatigue and sonic vibration.
	100 DEG FLUSH HEAD	NAS1399			
 LOCKED SPINDLE BULBED	PROTRUDING HEAD	NAS1738	5056 AL ALY MONEL (CAD PL) MONEL (BARE)	250 400 800	Same as NAS1398 and NAS1399 except also used for very thin sheet and double dimple applications due to large head formed on blind side of joint.
	100 DEG FLUSH HEAD	NAS1739			

STRUCTURAL IDENTIFICATION (Continued)

CHERRYMAX AND BULBED CHERRYLOCK RIVETS

Cherrymax and Bulbed Cherrylock rivets are the most common blind fastener used on the Sabreliner airplane. See the applicable table and figure for additional information.

CR-762 RIVET

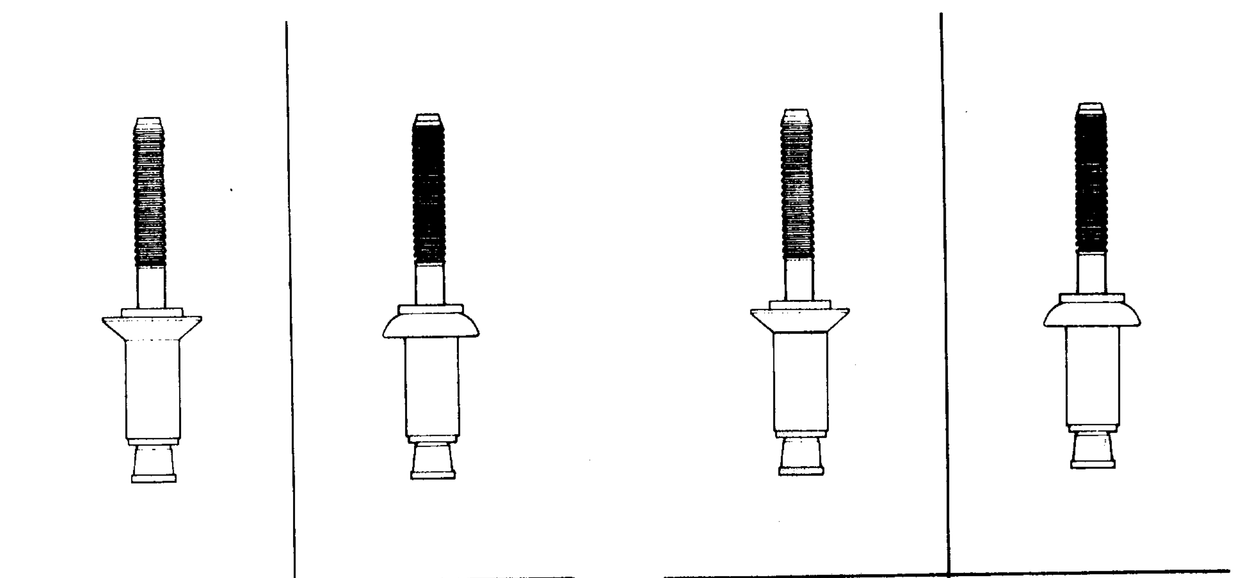
The Cherry CR-762 rivet is a wide-grip range, positive-hole-fill, high-clinch type blind fastener. The rivets may be installed with standard Cherry hand-powered or pneumatic guns. Modified controlled-stroke pulling heads for H80 series and H90 series are used. They are provided with replaceable spacer sleeves for positively controlling the length of pull. When the rivet is set, the shank is expanded against the face of the back material. This results in a drawing action and clinches the two materials together. The pull is stopped at a pre-determined point without breaking the stem. When the rivet is set, the stem protrudes 1/16 in. above the rivet head and gives a visual indication that the upset is properly formed, the hole is filled, and the rivet is properly set. The stems of installed rivets are trimmed with standard trimming equipment. (See table 11.)

CCR-264 RIVET

See figure 13.

FLUSH FRACTURE
LOCK SPINDLE
(NOMINAL & OVERSIZED DIAMETERS)

MONEL ***ALUMINUM***



MONEL

CR3522 Nominal **CR3552 Oversize**	**CR3523 Nominal** **CR3553 Oversize**
Monel Rivet & 15-7 CRES Stem	
CR 3522P Nominal **CR3552P Oversize**	**CR3523P Nominal** **CR3553P Oversize**
Monel Rivet Cad Plated & 15-7 CRES Stem	

ALUMINUM

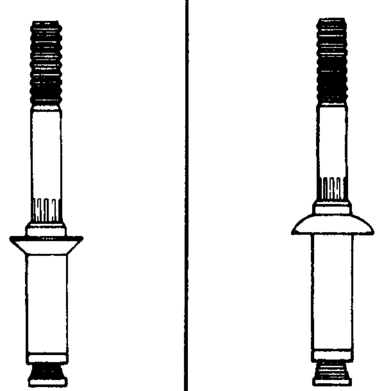
CR3212 Nominal **CR3242 Oversize**	**CR3213 Nominal** **CR3243 Oversize**
5056-F Rivet and Alloy Steel Stem	
CR3222 Nominal **CR3252 Nominal**	**CR3223 Nominal** **CR3253 Oversize**
5056-F Rivet & 15-7 CRES Stem	

Cherrymax Rivets
Figure 5

FLUSH FRACTURE
LOCKED SPINDLE

INCONEL 600

BULBED CHERRYLOCK®



CR2838	CR2839

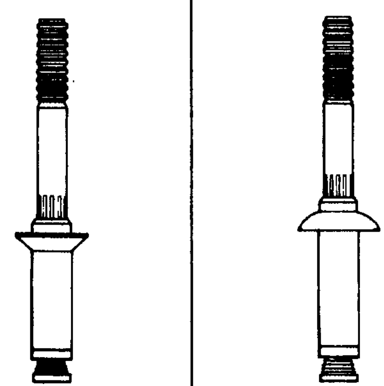
Inconel 600 Rivet & A286 Stem

CR2838CW	CR2839CW

Inconel 600 Rivet Cad Plated & A286 Stem

MONEL

BULBED CHERRYLOCK®



CR2538 (NAS 1739M)	CR2539 (NAS 1738M)

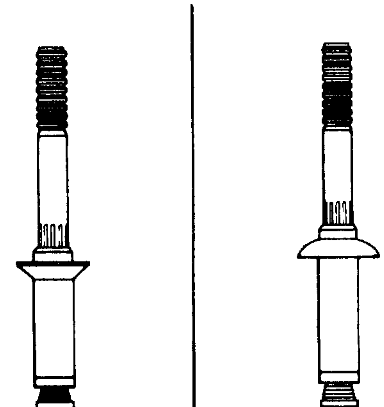
Monel Rivet & Inconel 600 Stem

CR2538P(NAS1739MW)	CR2539P(NAS1738MW)

Monel Rivet Cad Plated & Inconel 600 Stem

ALUMINUM

BULBED CHERRYLOCK®



CR2238 (NAS1739E)	CR2239 (NAS1738E)

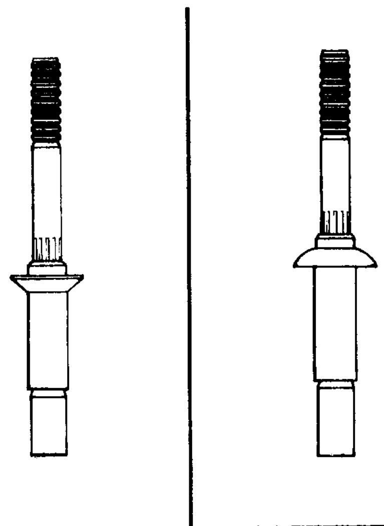
5056-F Rivet and Inconel 600 Stem

Cherrylock Rivets
Figure 6 (Sheet 1 of 2)

FLUSH FRACTURE
LOCKED SPINDLE

MONEL

CHERRYLOCK®



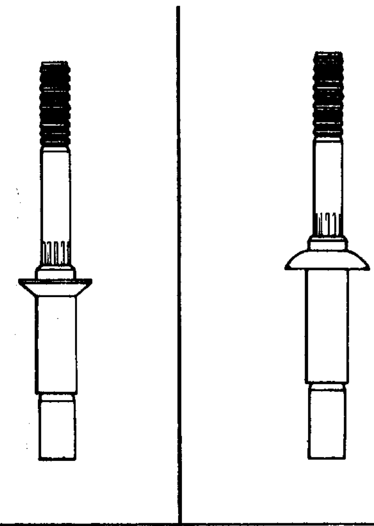
CR2562M (NAS1399M) | CR2563M (NAS1398M)
Monel Rivet & Monel Stem

CR2562S (NAS1399MS) | CR2563S (NAS1398MS)
Monel Rivet Silver Plated & Monel Stem

CR2562 (NAS1399MW) | CR2563 (NAS1398MW)
Monel Rivet Cad Plated & Monel Stem

A286 STAINLESS STEEL

CHERRYLOCK®



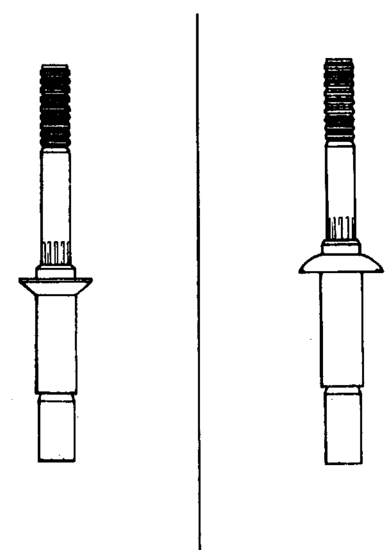
CR2662 (NAS1399C) | CR2663 (NAS1398C)
A286 Rivet and A286 Annealed Stem.

CR2652 | CR2653
A286 Rivet & A286 Annealed Stem

CR2642 | CR2643
A286 Rivet and A286 Hard Stem.

ALUMINUM

CHERRYLOCK®



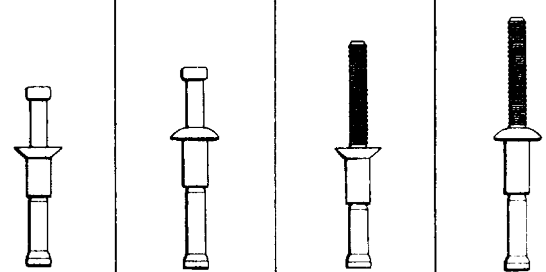
CR2162 (NAS1399D) | CR2163 (NAS1398D)
2017-T4 Rivet and 7075 Stem.

CR2262 (NAS1399B) | CR2263 (NAS1398B)
5056-F Rivet and 7075 Stem.

Cherrylock Rivets
Figure 6 (Sheet 2 of 2)

CHERRY SELF-PLUGGING MONEL RIVETS

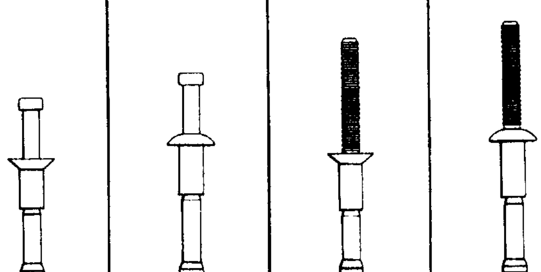
MS20600M — MONEL
MS20600MP — MONEL, CAD PLATED
MS20601M — MONEL
MS20601MP — MONEL, CAD PLATED



CR 562	CR 563	CR 9562	CR 9563
MS20601MP	*MS20600MP*	*MS20601MP*	*MS20600MP*
CR 562M	**CR 563M**	**CR 9562M**	**CR 9563M**
MS20601M	*MS20600M*	*MS20601M*	*MS20600M*

CHERRY SELF-PLUGGING ALUMINUM RIVETS

MS20600AD, MS20601AD — 2117 ALUMINUM
MS20600B, MS20601B — 5056 ALUMINUM



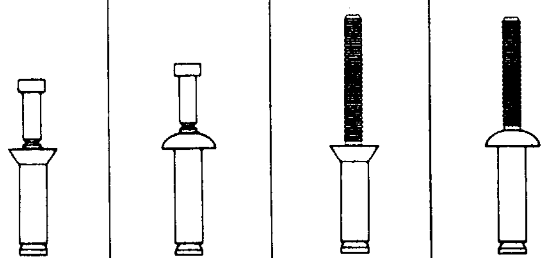
CR 156	CR 157	CR 9156	CR 9157
MS20601B	*MS20600B*	*MS20601B*	*MS20600B*
CR 162	**CR 163**	**CR 9162**	**CR 9163**
MS20601AD	*MS20600AD*	*MS20601AD*	*MS20600AD*

Cherry Self-Plugging Rivets
Figure 7

ALUMINUM RIVETS

MS20604AD, MS20605AD — 2117 ALUMINUM

MS20604B, MS20605B — 5056 ALUMINUM

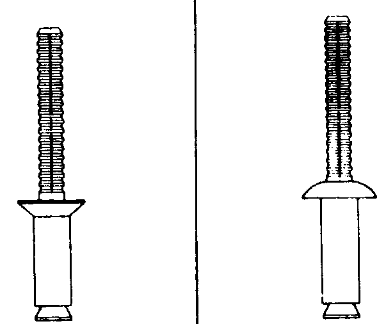


CR 116 MS20605AD	CR 117 MS20604AD	CR 9116 MS20605AD	CR 9117 MS20604AD
CR 126 MS20605B	CR 127 MS20604B	CR 9126 MS20605B	CR 9127 MS20604B

NUT-PLATE RIVETS

MILD STEEL, CAD PLATED

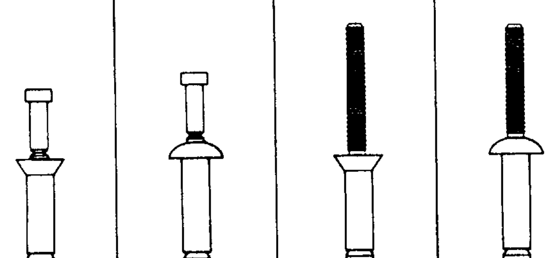
A286 STAINLESS STEEL



CCR264SS	CCR274SS
Mild Steel, Cad. Plated	
CCR264CS	CCR274CS
A286 Stainless Steel	

MONEL RIVETS

MS20604M — MONEL
MS20604MP — MONEL, CAD PLATED
MS20605M — MONEL
MS20605MP — MONEL, CAD PLATED



CR 516 MS20605M	CR 517 MS20604M	CR 9516 MS20605M	CR 9517 MS20604M
CR 516P MS20605MP	CR 517P MS20604MP	CR 9516P MS20605MP	CR 9517P MS20604MP

Cherry Pull-Through Rivets
Figure 8

Table 6. Bulbed Cherrylock Rivets — NAS Numbers to Cherry Rivet Numbers

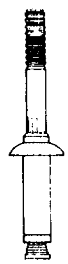
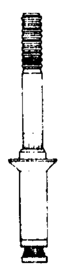
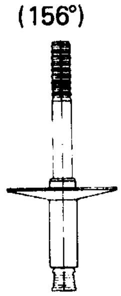
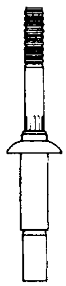
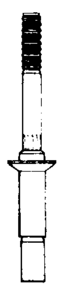
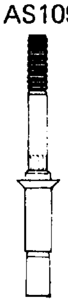
HEAD STYLE	NAS NUMBER	CHERRY NUMBER	RIVET MATERIAL	STEM MATERIAL
UNIVERSAL HEAD 	NAS 1738B	CR2249	5056 Aluminum	Alloy Steel, Cad. Plt'd.
	–	2A39	2219 Aluminum	Inconel 600
	1738E	2239	5056 Aluminum	Inconel 600
	1738M	2539	Monel	Inconel 600
	1738MW	2539P	Monel Cad. Plt'd.	Inconel 600
	–	2839	Inconel 600	A286 CRES
	–	2839CW	Inconel 600, Cad. Plt'd.	A286 CRES
COUNTERSUNK HEAD (MS20426) 	NAS 1739B	CR2248	5056 Aluminum	Alloy Steel, Cad. Plt'd.
	–	2A38	2219 Aluminum	Inconel 600
	1739E	2238	5056 Aluminum	Inconel 600
	1739M	2538	Monel	Inconel 600
	1739MW	2538P	Monel, Cad. Plt'd.	Inconel 600
	–	2838	Inconel 600	A286 CRES
	–	2838CW	Inconel 600, Cad. Plt'd.	A286 CRES
UNISINK HEAD 	–	CR2235	5056 Aluminum	Inconel 600
	–	2245	5056 Aluminum	Alloy Steel Cad. Plt'd.
	–	2545	Monel	Inconel 600
COUNTERSUNK HEAD (156°) 	–	CR2540	Monel	Inconel 600
	–	2840	Inconel 600	A286 CRES

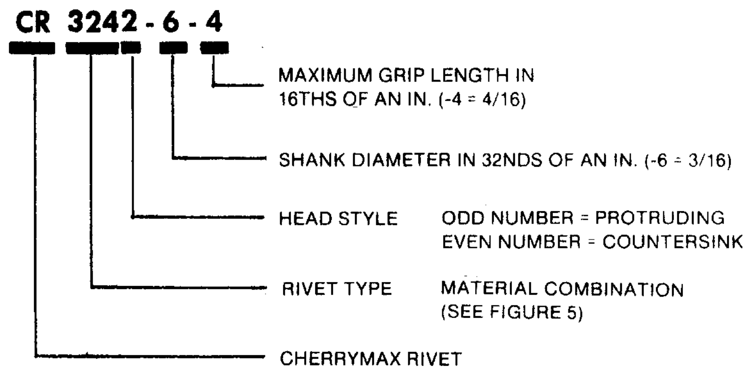
Table 7. Cherrylock Rivets — NAS Numbers to Cherry Rivet Numbers

HEAD STYLE	NAS NUMBER	CHERRY NUMBER	RIVET MATERIAL	STEM MATERIAL
UNIVERSAL	NAS 1398B	CR2263	5056 Aluminum	7075 Aluminum
HEAD	–	2A63	2219 Aluminum	2219 Aluminum
	–	2643 A	A286 CRES	A286 CRES, STA
	–	2653	A286 CRES	A286 CRES, Ann'ld. Plug
	1398C	2663	A286 CRES	A286 CRES, Ann'ld. Plug
	1398CW	2663CW	A286 CRES, Cad. Plt'd.	A286 CRES, Ann'ld. Plug
	1398D	2163	2017 Aluminum	7075 Aluminum
	1398M	2563M	Monel	Monel
	1398MS	2563S	Monel, Silver Plt'd.	Monel
	1398MW	2563	Monel, Cad. Plt'd.	Monel
COUNTERSUNK	NAS 1399B	CR2262	5056 Aluminum	7075 Aluminum
HEAD	–	2A62	2219 Aluminum	2219 Aluminum
(MS20426)	–	2642 A	A286 CRES	A286 CRES, STA
	–	2652	A286 CRES	A286 CRES, Ann'ld. Plug
	1399C	2662	A286 CRES	A286 CRES, Ann'ld. Plug
	1399CW	2662CW	A286 CRES, Cad. Plt'd.	A286 CRES, Ann'ld. Plug
	1399D	2162	2017 Aluminum	7075 Aluminum
	1399M	2562M	Monel	Monel
	1399MS	2562S	Monel, Silver Plt'd.	Monel
	1399MW	2562	Monel, Cad. Plt'd.	Monel
COUNTERSUNK	–	CR2164	2017 Aluminum	7075 Aluminum
HEAD	–	2A64	2219 Aluminum	2219 Aluminum
(NAS1097)	–	2664	A286 CRES	A286 CRES, Ann'ld. Plug
				

NOTE

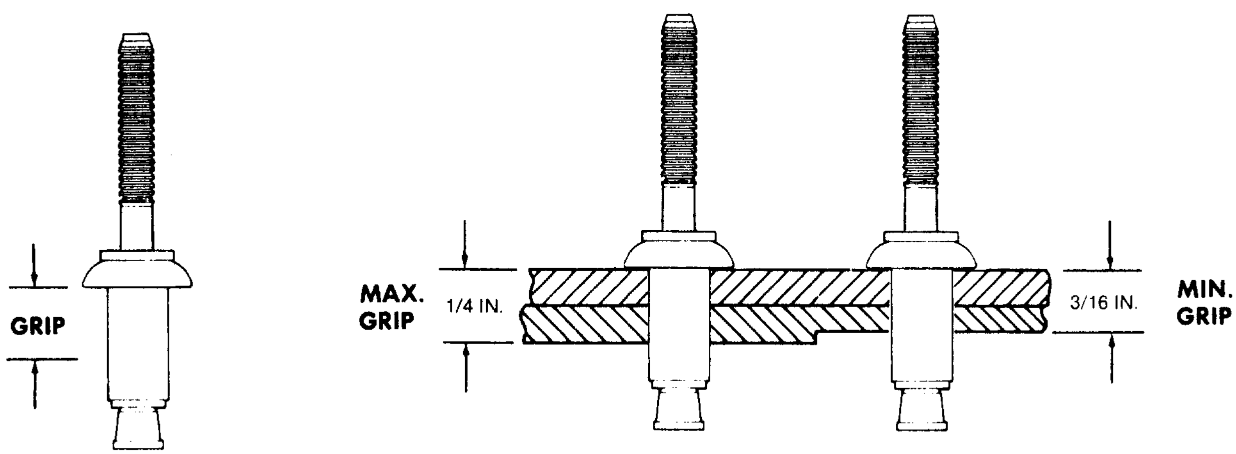
A 95KSI FASTENER FOR USE IN HIGH BEARING STRENGTH MATERIAL, STEEL, CRES, Ti, ETC.

Numbering System

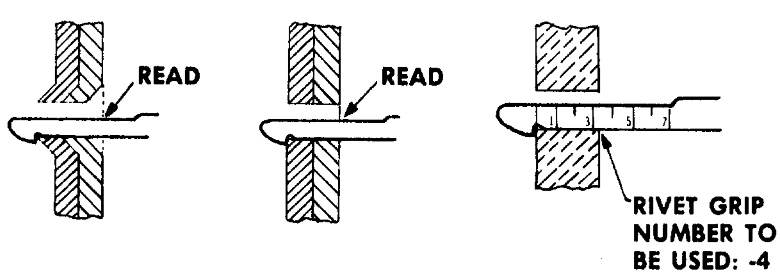


Grip Length

GRIP RANGE OF ALL CHERRYMAX RIVETS ARE IN INCREMENTS OF 1/16TH IN., WITH ULTIMATE DASH NUMBER INDICATING MAX GRIP IN 1/16THS. (EXAMPLE: -4 GRIP RIVET HAS GRIP RANGE OF 3/16 IN. TO 1/4 IN.)
REFER TO TABLE BELOW.



TO DETERMINE PROPER GRIP RIVET TO USE, MEASURE MATERIAL THICKNESS WITH A 269C3 CHERRY SELECTOR GAUGE AS SHOWN BELOW. ALWAYS READ TO NEXT HIGHER NUMBER.



TO FIND RIVET GRIP NUMBER, DETERMINE TOTAL THICKNESS OF MATERIAL TO BE FASTENED; LOCATE BETWEEN MINIMUM AND MAXIMUM COLUMNS ON MATERIAL THICKNESS CHART. READ DIRECTLY ACROSS TO RIGHT TO FIND GRIP NUMBER.

MATERIAL THICKNESS RANGE (IN.)		RIVET GRIP NO.
MINIMUM	**MAXIMUM**	
See Stds. Pages	1/16	1
See Stds. Pages	1/8	2
1/8	3/16	3
3/16	1/4	4
1/4	5/16	5
5/16	3/8	6
3/8	7/16	7
7/16	1/2	8
1/2	9/16	9
9/16	5/8	10
5/8	11/16	11
11/16	3/4	12

FOR DOUBLE DIMPLED SHEETS, ADD CTSK. HEAD HEIGHT TO MATERIAL THICKNESS.

Cherry Rivet Number System
Figure 9

Table 8. Recommended Drill Sizes and Hole Size Limits

RIVET SHANK DIAMETER (IN.)	CHERRY RIVET DIAMETER DASH NUMBER	RECOMMENDED FINISH DRILL A	INSPECTION LIMITS MINIMUM (IN.)	INSPECTION LIMITS MAXIMUM (IN.)
3/32	–3	#40	0.097	0.101
1/8	–4	#30	0.129	0.132
5/32	–5	#20	0.160	0.164
3/16	–6	#10	0.192	0.196
7/32	–7	#2	0.220	0.225
1/4	–8	#F	0.256	0.261
9/32	–9	#L	0.289	0.295
1/8 oversize	–4	#29	0.137	0.141
5/32 oversize	–5	#16	0.177	0.181
3/16 oversize	–6	#5	0.206	0.210
9/32 Monel	–9	#M	0.294	0.300

Table 9. Material Thickness Chart

MATERIAL THICKNESS RANGE		RIVET GRIP NO.	
MINIMUM (IN.)	MAXIMUM (IN.)	KNOB STEM	SERRATED STEM
SEE STANDARDS PAGES	1/16	2	1
SEE STANDARDS PAGES	1/8	4	2
1/8	3/16	6	3
3/16	1/4	8	4
1/4	5/16	10	5
5/16	3/8	12	6
3/8	7/16	14	7
7/16	1/2	16	8
1/2	9/16	18	9
9/16	5/8	20	10
5/8	11/16	22	11
11/16	3/4	24	12
3/4	13/16	26	13
13/16	7/8	28	14
7/8	15/16	30	15
15/16	1	32	16

Table 10. Rivet Heat Height

RIVET SIZE	HEAD HEIGHT
3/32	0.036
1/8	0.042
5/32	0.055
3/16	0.070
7/32	0.082
1/4	0.095
9/32	0.100

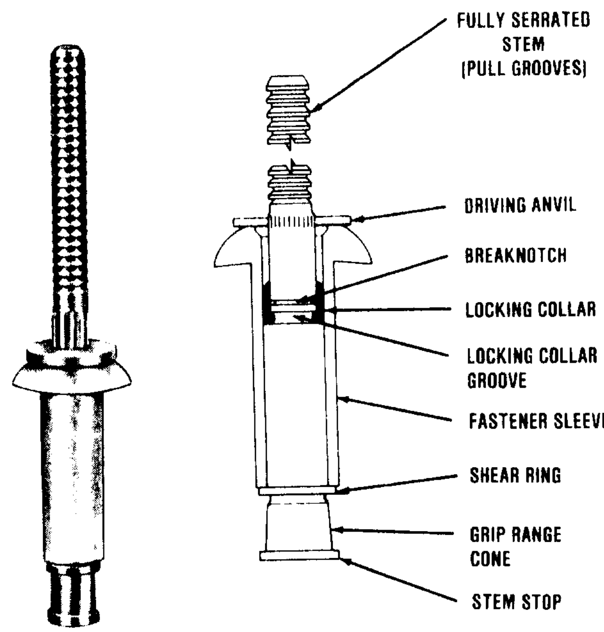
NOTES

A DRILL SIZES NOTED ARE THOSE THAT NORMALLY PROVIDE HOLES WITHIN LIMITS LISTED WHEN PRE-DRILLING IS NOT USED. WHEN A CHECK REVEALS UNDERSIZE OR OVERSIZE HOELS ARE RESULTING, DRILL SIZE SHOULD BE ADJUSTED ACCORDINGLY.

- TO FIND RIVET GRIP NUMBER, DETERMINE TOTAL THICKNESS OF MATERIAL TO BE FASTENED; LOCATE BETWEEN MINIMUM AND MAXIMUM COLUMNS ON MATERIAL THICKNESS CHART. THEN READ DIRECTLY ACROSS TO RIGHT TO FIND GRIP NUMBER.
- ALL CHERRY RIVETS MAY BE USED IN MATERIAL 1/64 IN. THICKER THAN SHOWN IN MAXIMUM COLUMN AND THUS COMPLY WITH GRIP REQUIREMENTS.
- FOR DOUBLE DIMPLED SHEETS, ADD RIVET HEAD HEIGHT TO MATERIAL THICKNESS. SEE TABLE 11.
- DIMENSIONS ARE IN INCHES.

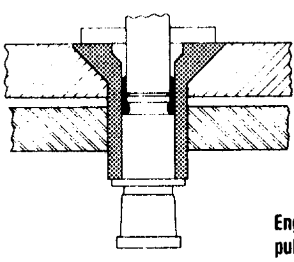
Cherry MAX consists of four components assembled as a single unit:

1. A fully serrated fastener stem with break notch, shear ring and plug section.
2. A locking collar that provides a mechanical lock to stem.
3. The fastener sleeve with a locking collar dimple to receive locking collar.
4. The CherryMAX driving anvil, which insures flush stem breaks and a flush installed collar at *all times*.



HOW THEY WORK

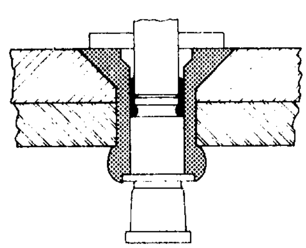
(1)



BEFORE PULLING BEGINS —

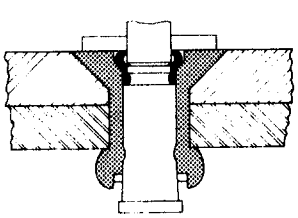
Engage pulling serrations of stem with jaws of pulling head.

(2)



Stem is pulled into rivet sleeve and starts to form a large bulbed blind head; seats manufactured head; clamps sheets tightly together and hole filling action begins.

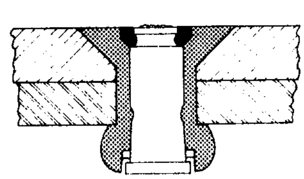
(3)



Formation of blind head and hole filling are completed.

Shear ring shears from cone to allow stem to pull further into rivet sleeve.

(4)

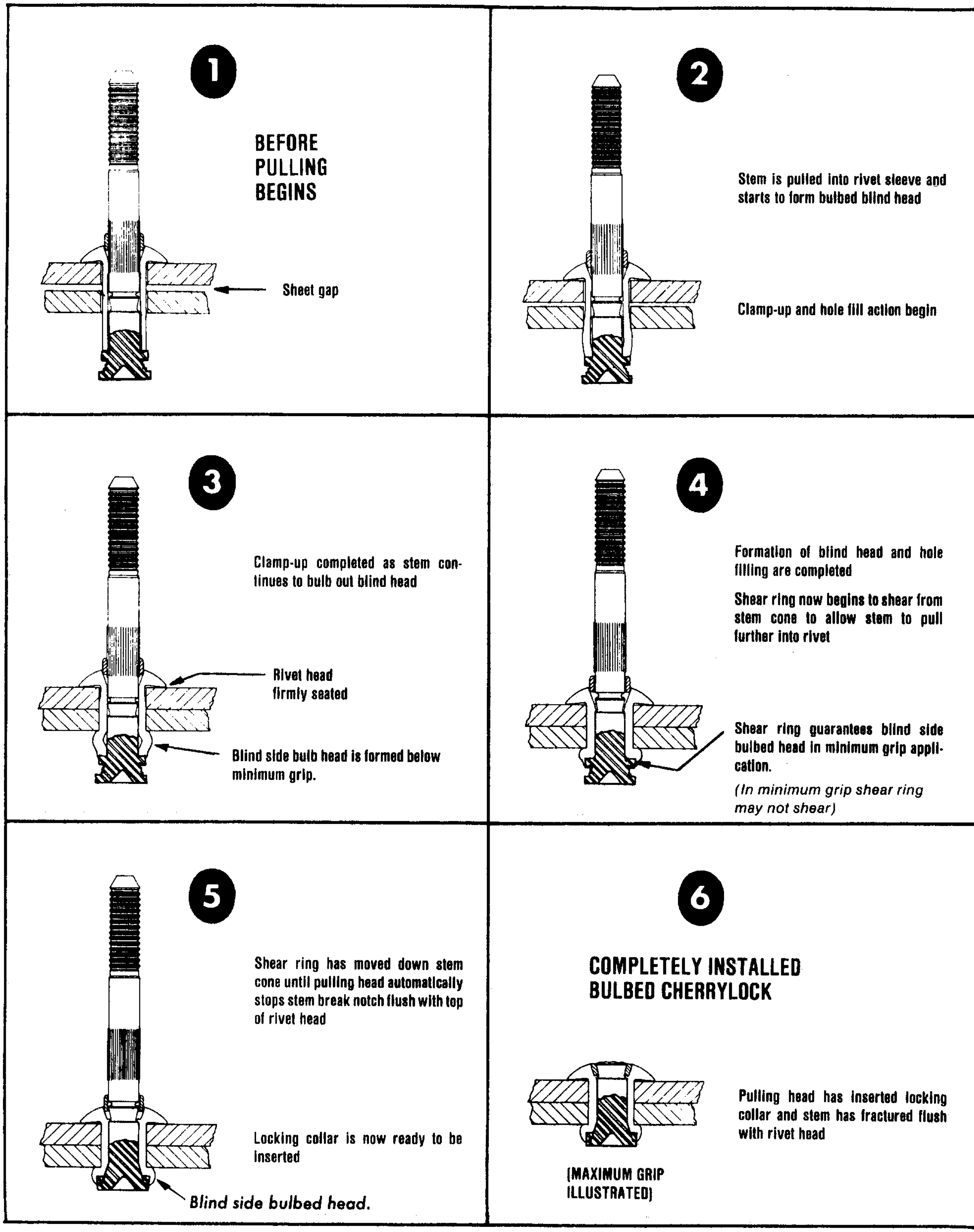


Pressure of driving anvil forms locking collar into collar recess, locking stem and sleeve together.

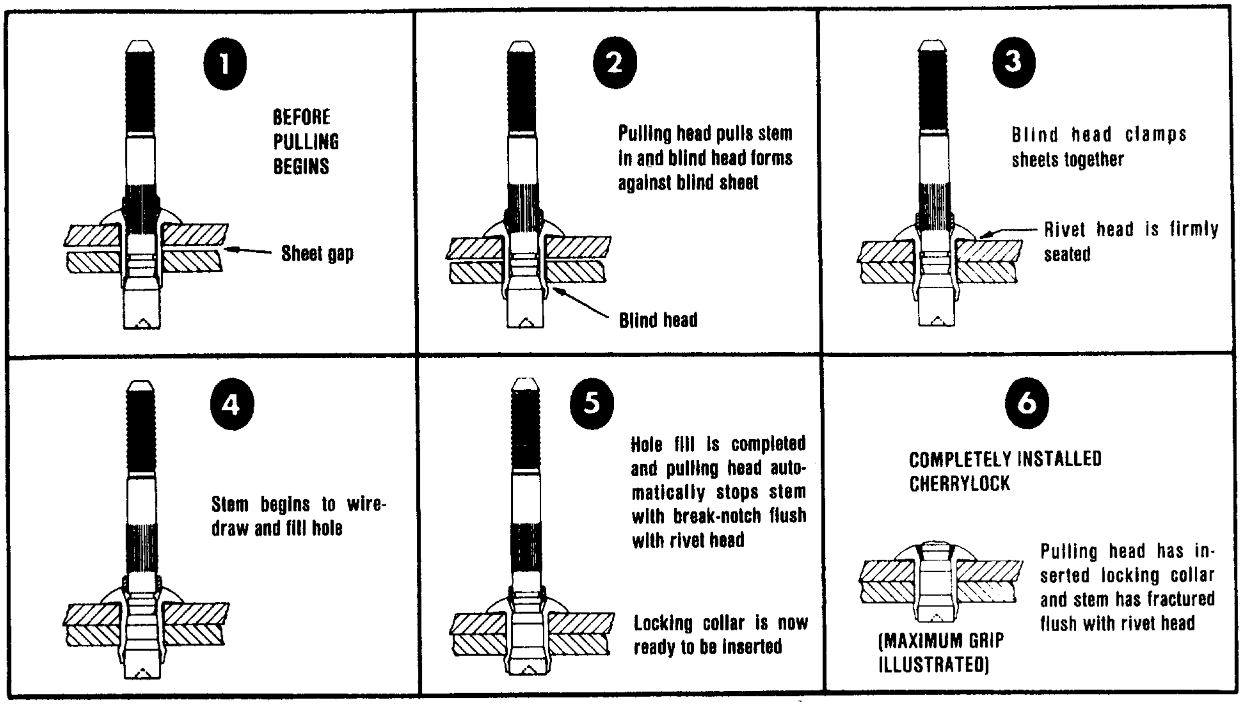
Continued pulling fractures stem, providing a flush, burr-free installation.

INSTALLATION COMPLETE

Cherrymax Rivets — How They Work
Figure 10



Bulbed Cherrylock Rivets — How They Work
Figure 11



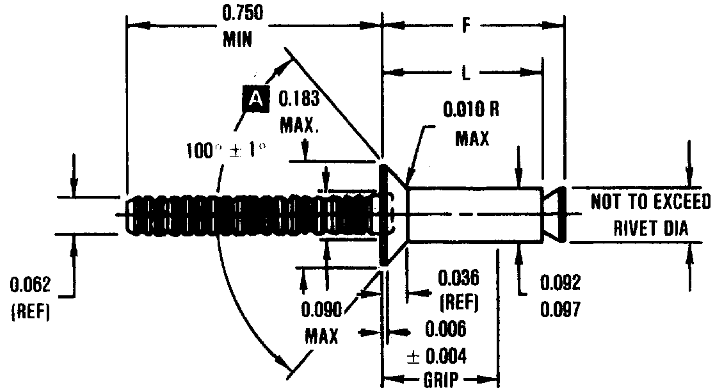
Cherrylock Rivets — How They Work
Figure 12

Table 11. CR-762 Cherry Rivet Gun — Pulling Heads

RIVET SIZE (INCH)	PULLING HEAD NUMER
H80 SERIES	
1/8 dia	H804U Universal head H804C Countersunk head
5/32 dia	H804U Universal head H804C Countersunk head
3/16 dia	H804U Universal head H804C Countersunk head
H90 SERIES	
1/8 dia	H904U Universal head H904C Countersunk head
5/32 dia	H904U Universal head H904C Countersunk head
3/16 dia	H904U Universal head H904C Countersunk head
7/32 dia	H904U Universal head H904C Countersunk head
1/4 dia	H904U Universal head H904C Countersunk head
9/32 dia	H904U Universal head H904C Countersunk head

NOTE

REFER TO SOURCE KEY 024 IN 51-30-00 TABLE 2 FOR MANUFACTURER.



GRIP LIMITS 1/16 IN RANGE		DASH NO.		L (IN.) MAX	F (IN.) MAX
MIN	MAX	C-1018 STEEL	A-286 CRES		
0.046	0.062	3-1		0.140	0.218
0.063	0.125	3-2	3-2	0.203	0.281
0.126	0.187	3-3	3-3	0.265	0.343
0.188	0.250	3-4	3-4	0.328	0.405
0.251	0.312	3-5	3-5	0.390	0.468
0.313	0.375	3-6		0.453	0.530
0.376	0.437	3-7		0.515	0.593
0.438	0.500	3-8		0.578	0.656

NOTES

- DIMENSIONS ARE IN INCHES.
- A HEAD DIAMETERS ARE TO THEORETICAL SHARP CORNERS AS MEASURED BY PROJECTION

FEDERAL SUPPLY CODE IDENT NO. 11815

SERIES NO.	MATERIAL		FINISH	
	RIVET	STEM	RIVET	STEM
CCR 264CS	A-286 CRES AMS 5736	305 CRES	Solid Film Coat CHERRY Spec. C-48	PASSIVATE QQ-P-35
CCR264SS	C-1018 Steel Annealed	C-1008 Steel	Cadmium Plate QQ-P-416 Type II	Rust Preventive (Oil Base)

CCR-264-3 Cherry Nut-Plate Rivet
Pull Thru Stem 100° Countersunk Head
Figure 13

STRUCTURAL IDENTIFICATION (Continued)

CHOBERT BLIND RIVETS

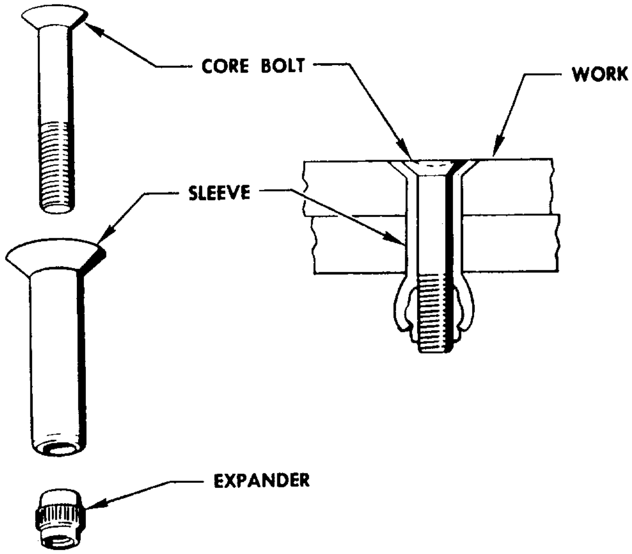
The 224/000 series of Chobert blind rivets are the only rivets of this type used on the airplane. This type of rivet is lower in tensile strength than the conventional AD3 rivet, and is used exclusively for the attachment of nut plates in specific area. Chobert blind rivets are not to be used in integral fuel tank areas, pressure barriers, blind close-out areas, or exterior skins. A restriction is also placed on the use of Chobert blind rivets in areas where the temperature is expected to exceed 260°C (500°F). Chobert blind rivets are installed with a special Chobert blind rivet gun containing the rivets to be installed in a special tubular magazine. Each magazine contains from 23 to 95 rivets, depending upon the length of the rivet. Chobert blind rivets are obtained in increments of 1/16 inch. Refer to Source Key 025 in 51-30-00 table 2.

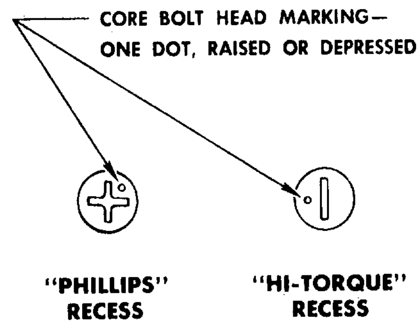
MECHANICAL FASTENERS

STRUCTURAL IDENTIFICATION

HIGH SHEAR BLIND BOLTS AND BLIND NUTS

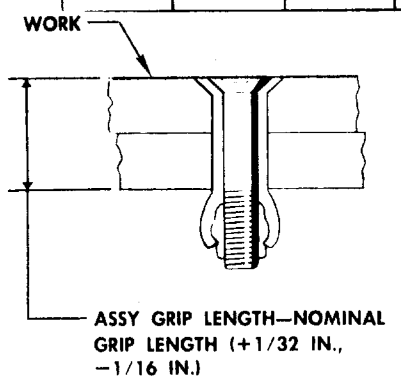
The Hi-Shear blind bolt and blind nut fastener consists of three parts: a core bolt, a sleeve, and an expander, or nut. A special tool is used to accomplish installation. The bolts and other parts, with installation tools, are shown in figure 1.





BB351 BLIND BOLT

BB351 BOLT ASSY		BB301 CORE BOLT			BB321 SLEEVE		BB341 EXPANDER	
FIRST DASH NO.	NOMINAL DIA (IN.)	FIRST DASH NO.	HEAD RECESS	SIZE/ THREAD	FIRST DASH NO.	OD (IN.)	FIRST DASH NO.	SIZE/ THREAD
-5	5/32	-5	PHILLIPS NO. 1	4-40NC-3A	-5	0.169 0.166	-5	4-40NC-3B
-6	3/16	-6	PHILLIPS NO. 1	5-40NC-3A	-6	0.196 0.193	-6	5-40NC-3B
-8	1/4	-8	PHILLIPS NO. 2	8-32NC-3A	-8	0.257 0.254	-8	8-32NC-3B
-10	5/16	-10	HI-TORQUE NO. 3	12-28NF-3A	-10	0.338 0.335	-10	12-28NF-3B
-12	3/8	-12	HI-TORQUE NO. 4	1/4-28UNF-3A	-12	0.390 0.387	-12	1/4-28UNF-3B



BB351 BOLT ASSEMBLY

CODE: First dash number indicates nominal diameter of blind bolt assembly in 32nds. Second dash number indicates assembly grip length (thickness of work) in 16ths.

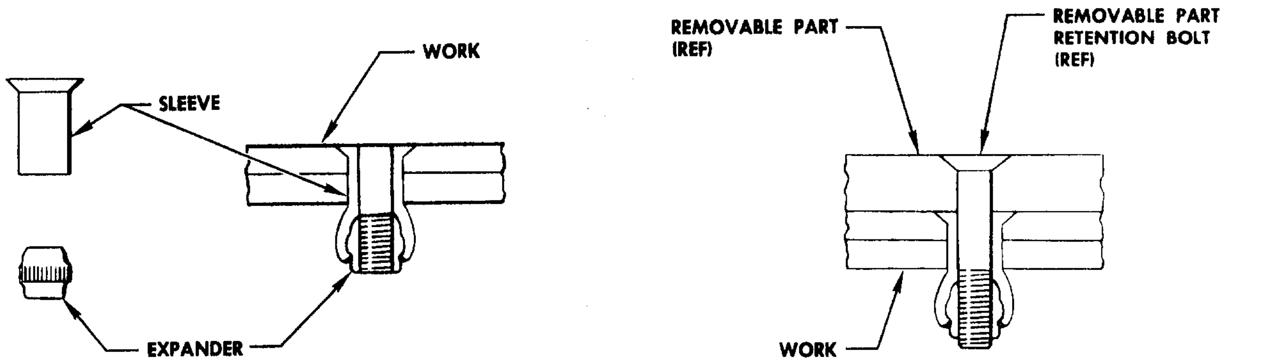
EXAMPLE:

BB351-8-12

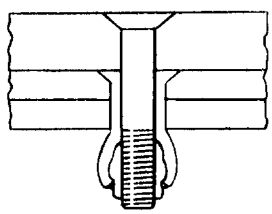
- 3/4 ASSEMBLY GRAP LENGTH (+1/32 IN, -1/16 IN.)
- 1/4 NOMINAL DIAMETER BLIND BOLT ASSEMBLY
- BLIND BOLT ASSEMBLY, WHICH INCLUDES BB301 CORE BOLT, BB321 SLEEVE, AND BB341 EXPANDER

S265-3-52

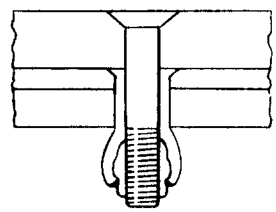
Hi-Shear Blind Bolts and Blind Nuts
Figure 1 (Sheet 1 of 4)



BLIND NUT INSTALLATION



BN359 BLIND NUT
WITH SHEAR-TYPE
COUNTERSUNK HEAD
(BN329 SLEEVE)



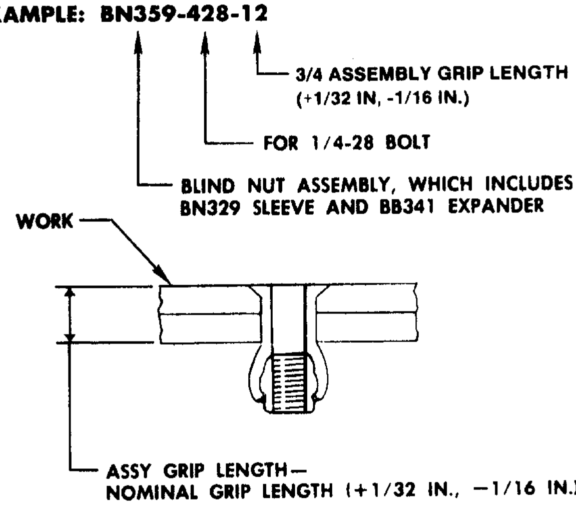
BN360 BLIND NUT
WITH SHALLOW
COUNTERSUNK HEAD
(BN330 SLEEVE)

BN359 AND BN360 BLIND NUT ASSY	BN329 SLEEVE A AND BN330 SLEEVE B		BB341 EXPANDER	
FIRST DASH NO.	FIRST DASH NO.	OD (IN.)	FIRST DASH NO.	THREAD
-832	-832	0.257 0.255	-8	8-32NC-3B
-1032	-1032	0.312 0.309	-10	10-32NC-3B
-424	-428	0.390 0.387	-12	1/4-28NF-3B
-524	-524	0.468 0.465	-14	5/16-24NF-3B
-624	-624	0.530 0.527	-16	3/8-24NF-3B

BN359 BLIND NUT ASSEMBLY

CODE: First dash number indicates size of bolt to be used. Second dash number indicates assembly grip length (thickness of work) in 16ths.

EXAMPLE: BN359-428-12

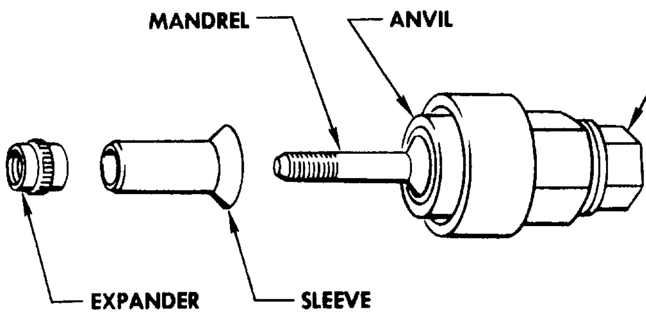


NOTES

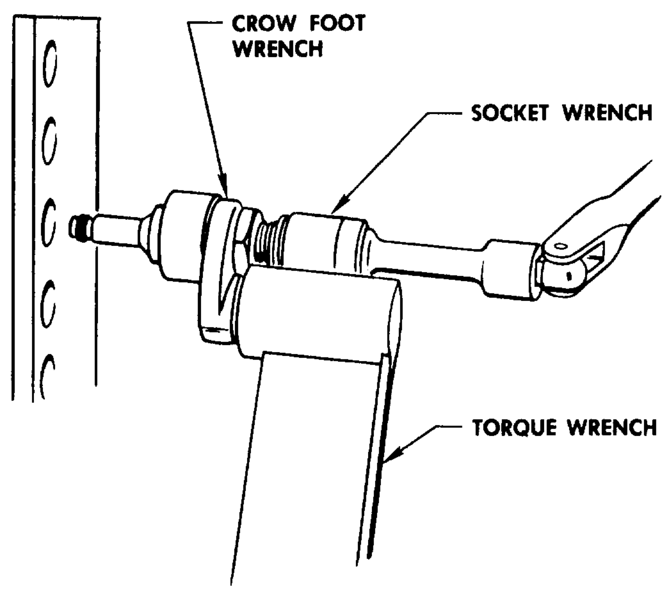
A USED ON BN359 BLIND NUT ASSY
B USED ON BN360 BLIND NUT ASSY

S265-3-53

Hi-Shear Blind Bolts and Blind Nuts
Figure 1 (Sheet 2 of 4)



Hand tools are used in combination with standard torque and crow foot wrenches with socket or open-end wrenches.



INSTALLATION INSTRUCTIONS

1 Turn chuck bolt ccw to fully engage in body. Slip sleeve onto mandrel. Spin expander onto threaded end of mandrel until it is finger-tight.

2 Turn chuck bolt cw to seat anvil (on body) firmly onto head of sleeve.

3 Insert expander and sleeve (on mandrel) fully into hole in work.

4 Using a wrench to hold chuck bolt, turn hex on body in a ccw direction with a torque wrench with crowfoot wrench until expander resists wrenching action. To prevent mandrel breakage from overtorquing (particularly on -5, -6 and -8 sizes), do not exceed torque loads listed below.

TORQUE VALUES

BLIND BOLT SIZE	BLIND NUT SIZE	TORQUE LOADS (IN.-LB)	TORQUE WRENCH WITH AN8586 CROWFOOT (IN.-LB) A
-5	-440	65-75	60-70
-6		85-95	80-90
	-632	97-108	90-100
-8	-832	190-215	175-200
	-1032	270-295	250-275
-10		295-320	275-300
-12	-428	465-495	425-450

NOTE

A IF OTHER CROWFOOT WRENCHES ARE USED, THE INDICATED TORQUE MUST BE CALCULATED.

5 To remove tool, turn hex on body cw a half turn to loosen and unscrew chuck bolt from expander threads.

HOLE PREPARATION

BLIND BOLT SIZE	BLIND NUT SIZE	HOLE DIA (IN.)
-5		0.173 0.170
-6		0.201 0.197
-8	-832	0.264 0.258
-10		0.345 0.339
	-1032	0.319 0.313
-12	-428	0.397 0.391
	-524	0.477 0.469
	-624	0.539 0.531

S265-3-54

Hi-Shear Blind Bolts and Blind Nuts
Figure 1 (Sheet 3 of 4)

HAND TOOLS

BLIND BOLT OR BLIND NUT PART NO.	HAND TOOL PART NO.		CROWFOOT WRENCH PART NO.
	(0-1 GRIP RANGE)	(1-2 GRIP RANGE)	
BB351-5	BH100-5-M2	—	AN8506-6
BB351-6	BH100-6-M2	—	AN8506-6
BB351-8	BH100-8-M2	BH100-8-M3	AN8506-6
BB351-10	BH100-10-M2	BH100-10-M3	AN8506-6
BB351-12	BH200-12-M2	BH200-12-M3	AN8506-10
BN359-832	BH110-832-M2	BH110-832-M3	AN8506-6
BN359-1032	BH110-1032-M2	BH110-1032-M3	AN8506-6
BN359-428	BH210-428-M2	BH210-428-M3	AN8506-10
BN360-440	BH120-440-M2	BH120-440-M3	AN8506-6
BN360-632	BH120-632-M2	BH120-632-M3	AN8506-6
BN360-832	BH120-832-M2	BH120-832-M3	AN8506-6
BN360-1032	BH120-1032-M2	BH120-1032-M3	AN8506-6
BN360-428	BH220-428-M2	BH220-428-M3	AN8506-10

BLIND BOLT CORE BOLT DRIVERS

BLIND BOLT FIRST DASH NO.	CORE BOLT RECESS TYPE	HI-TORQUE ONE-PIECE DRIVER	
		SQUARE DRIVE SOCKET	PART NO.
-5	PHILLIPS NO. 1		
-6	PHILLIPS NO. 1		
-8	PHILLIPS NO. 2		
-10	HI-TORQUE	1/4	HTS3
-12	HI-TORQUE	3/8	HTS4
-14	HI-TORQUE	3/8	HTS5
-16	HI-TORQUE	3/8	HTS6

BLIND BOLT AND BLIND NUT REMOVAL

Unscrew core bolt when applicable. Using a drill one size smaller than OD of sleeve, drill until its countersunk or protruding head breaks out. Use a straight pin punch to tap out remainder of sleeve and expander.

Hi-Shear Blind Bolts and Blind Nuts
Figure 1 (Sheet 4 of 4)

STRUCTURAL IDENTIFICATION (Continued)

INTERNALLY THREADED SLEEVE FASTENERS (JO-BOLTS)

Internally threaded, self-locking, blind fasteners consist of three parts: a threaded nut, screw, and an expandable sleeve. Installation is accomplished by a special tool that allows the screw to be turned while the nut is held stationary. The turning action draws the sleeve over the tapered portion of the nut and against the underside of the surfaces being joined. The slabbed portion of the screw is snapped off flush or below the head of the nut. Milling operations are therefore not normally required. The primary use of this fastener is in shear type applications where access to the blind side is limited. (See figure 2.)

PART NO.	DIAMETER (IN.)	HOLE SIZE (IN.)	COUNTERSINK DIAMETER
164	5/32	0.1640-0.1660	100 Deg × 0.328
200	3/16	0.1990-0.2020	100 Deg × 0.381
260	1/4	0.2600-0.2630	100 Deg × 0.503
312	5/16	0.3120-0.3155	100 Deg × 0.630
375	3/8	0.3750-0.3790	100 Deg × 0.757

CODING FOR SELECTION OF PROPER FASTENERS

F indicates flush head.
P indicates protruding head.
260 indicates diameter in thousands.
Last dash number indicates nominal grip length in 1/16ths.
EXAMPLE: F260-4 flush head—0.260 dia—1/4 nominal grip

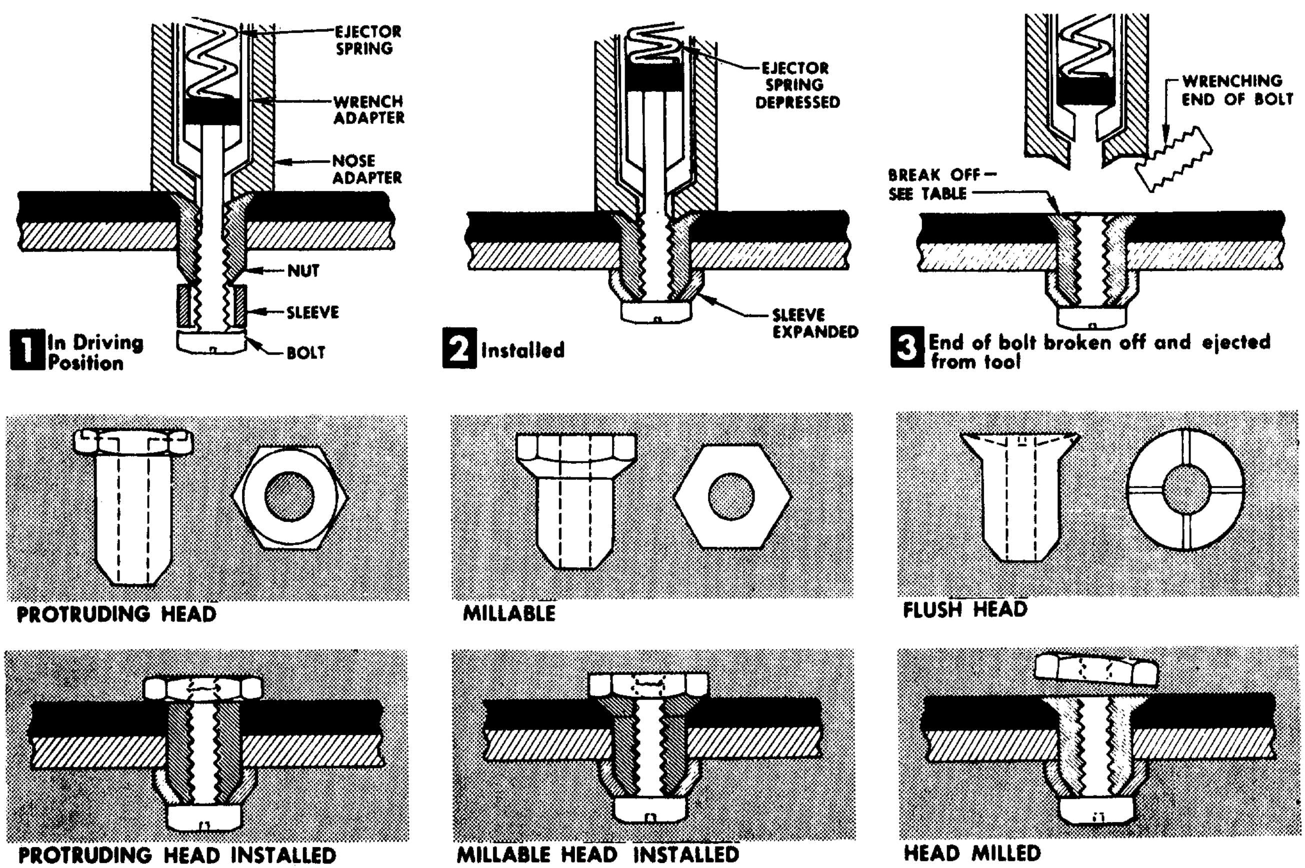
HEAD STYLE	STEM BREAK-OFF TOLERANCES				
	5/32	3/16	1/4	5/16	3/8
Flush	+0.010 −0.068	+0.000 −0.078	+0.000 −0.078	+0.000 −0.083	+0.000 −0.083
Protruding	+0.078 +0.000	+0.093 +0.015	+0.115 +0.037	+0.130 +0.047	+0.142 +0.059

NOTE

DIMENSIONS SHOWN ARE IN INCHES.

TABLE OF GRIP LENGTHS

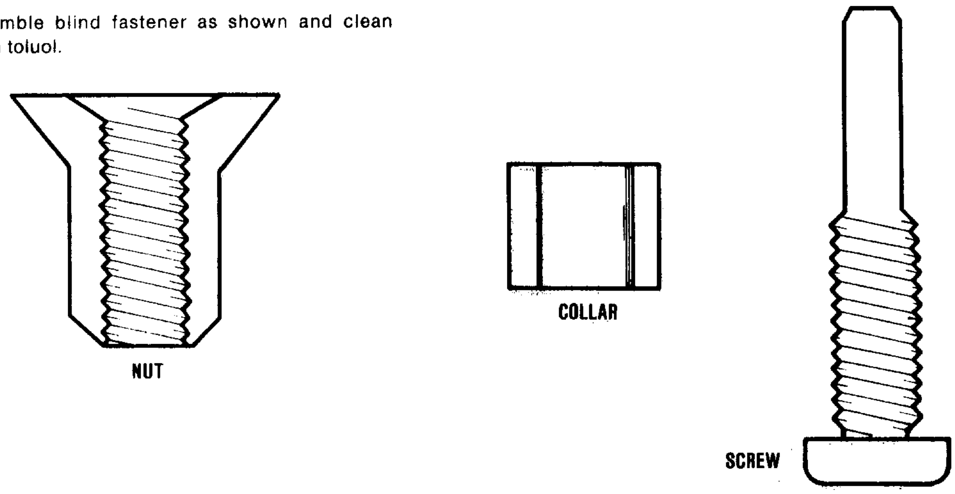
DASH NO.	2	3	4	5	6	7	8	9	10
Grip Length Min	0.094	0.156	0.219	0.281	0.344	0.406	0.469	0.531	0.594
Grip Length Max	0.156	0.219	0.281	0.344	0.406	0.469	0.531	0.594	0.656



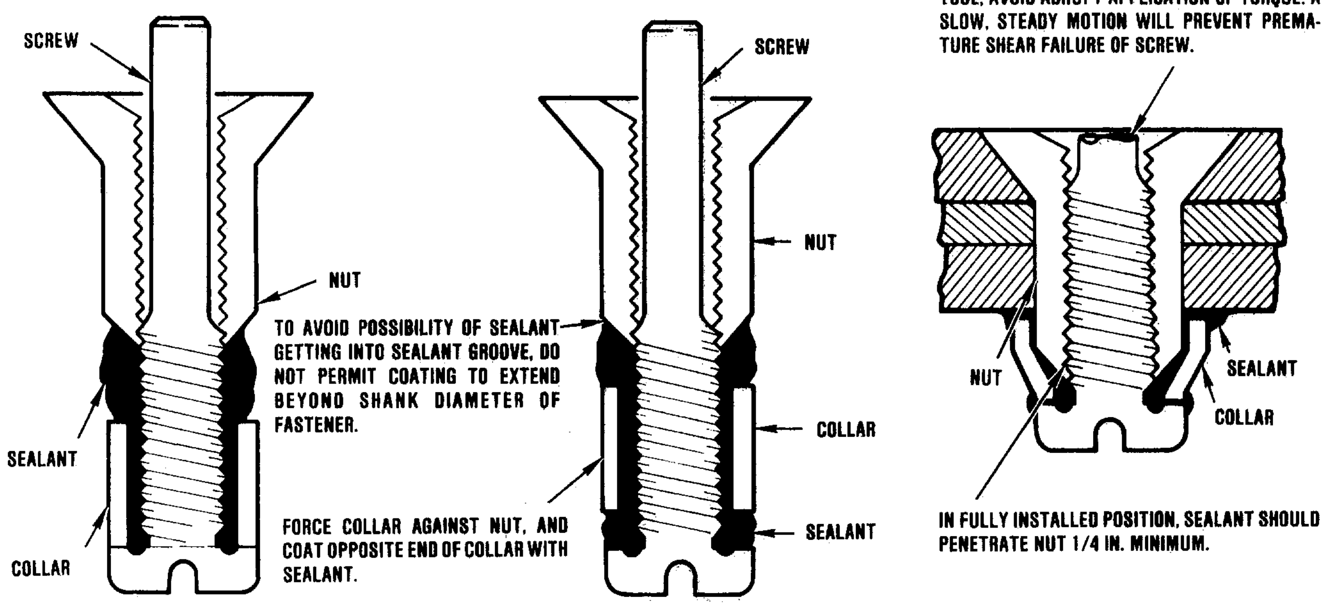
Blind Fasteners - Threaded Sleeve (Jo-Bolt)
Figure 2 (Sheet 1 of 4)

DISASSEMBLY OF BLIND FASTENER FOR INSTALLATION IN FUEL SEALED AREA

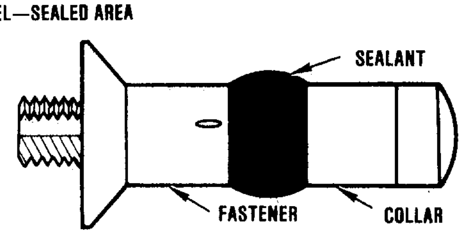
1 Disassemble blind fastener as shown and clean thoroughly in toluol.



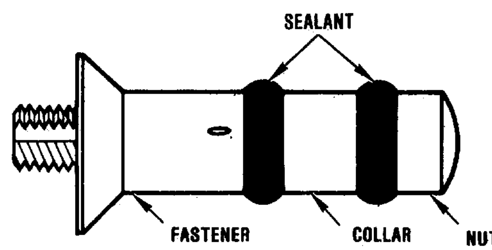
2 Reassemble blind fastener and apply sealant as shown.



PREPARATION OF BLIND FASTENER THAT CANNOT BE DISASSEMBLED FOR INSTALLATION IN FUEL—SEALED AREA



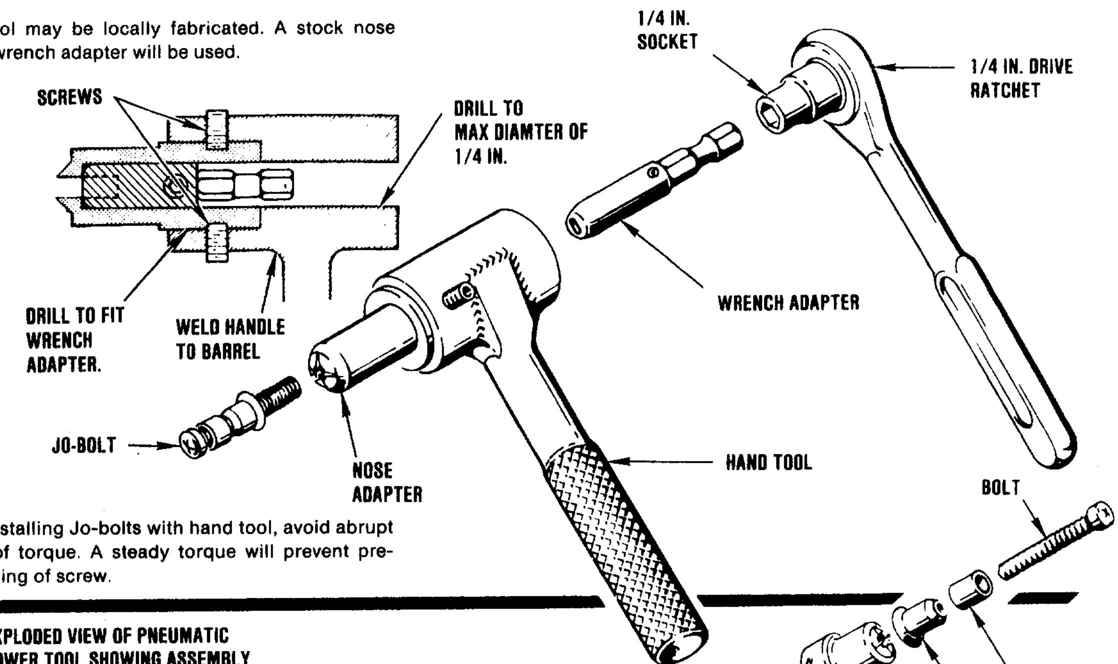
1 Move collar down on shank and cover area between collar and fastener with sealant.



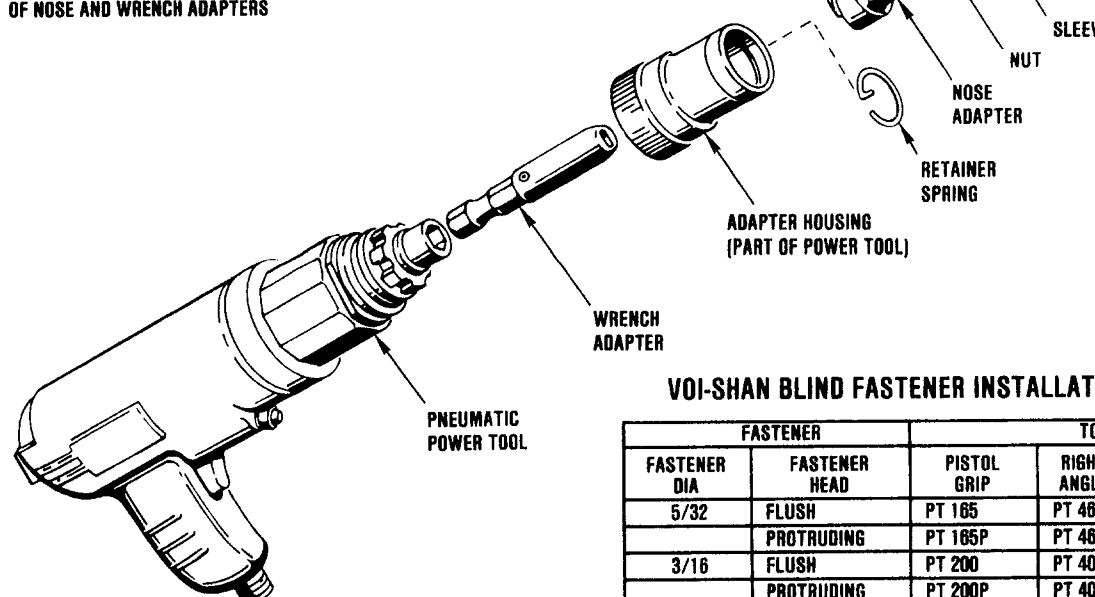
2 Move collar up on shank and cover area between collar and screw with sealant.

Blind Fasteners - Threaded Sleeve (Jo-Bolt)
Figure 2 (Sheet 2 of 4)

1 Hand tool may be locally fabricated. A stock nose adapter and wrench adapter will be used.



2 When installing Jo-bolts with hand tool, avoid abrupt application of torque. A steady torque will prevent premature breaking of screw.



VOI-SHAN BLIND FASTENER INSTALLATION TOOLS

FASTENER		TOOL		
FASTENER DIA	FASTENER HEAD	PISTOL GRIP	RIGHT ANGLE	HAND TOOL
5/32	FLUSH	PT 165	PT 465	HWF 165
	PROTRUDING	PT 165P	PT 465P	HWP 165
3/16	FLUSH	PT 200	PT 400	HWF 200
	PROTRUDING	PT 200P	PT 400P	HWP 200
1/4	FLUSH	PT 260	PT 460	HWF 260
	PROTRUDING	PT 260P	PT 460P	HWP 260
5/16	FLUSH	PT 312	—	HWF 312
	PROTRUDING	PT 312P	—	HWP 312
3/8	FLUSH	PT 375	—	HWP 375
	PROTRUDING	PT 375P	—	HWP 375

JO-BOLT FASTENER INSTALLATION TOOLS

HAND TOOLS	PART NO.	POWER TOOLS	PART NO.
HAND DRIVER	HW 300	POWER DRIVER	302
HAND ADAPTER (F200)	HW 2000	POWER ADAPTER (F200)	PW 300
HAND ADAPTER (P200)	HW 2000P	POWER ADAPTER (P200)	PW 300P
HAND ADAPTER (F260)	HW 2600	POWER ADAPTER (F260)	PW 360
HAND ADAPTER (P260)	HW 2600P	POWER ADAPTER (P260)	PW 360P
HAND ADAPTER (F312)	HW 3120	POWER ADAPTER (F312)	PW 312

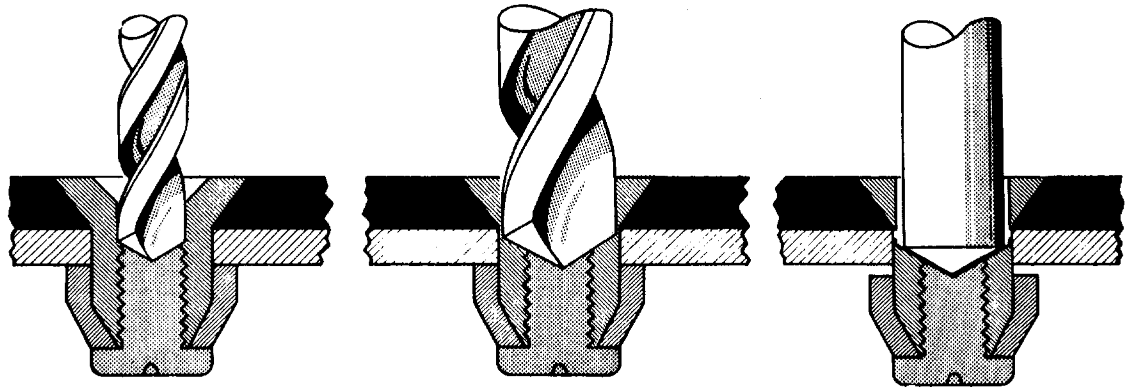
S265-3-60A

Blind Fasteners - Threaded Sleeve (Jo-Bolt)
Figure 2 (Sheet 3 of 4)

NOTE

DIMENSIONS SHOWN ARE IN INCHES.

REMOVAL

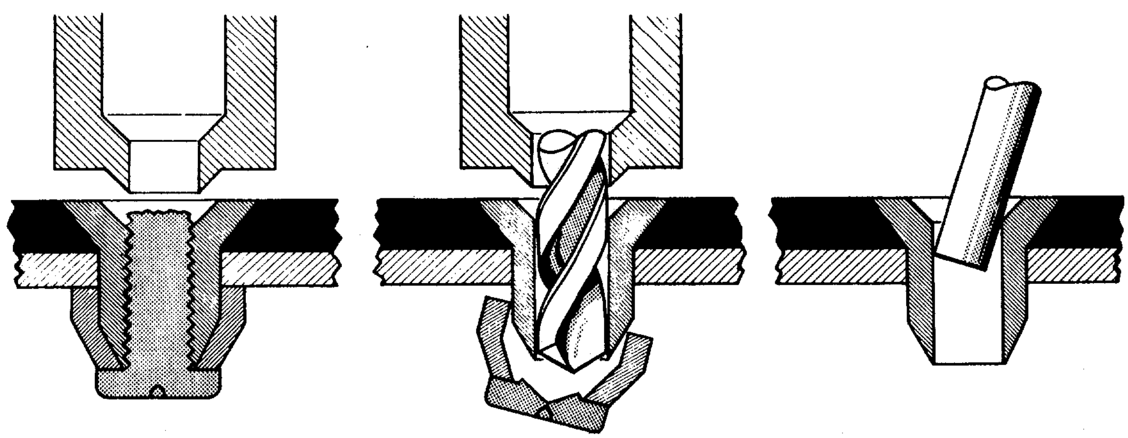


SELECT DRILL IN ACCORDANCE WITH TABLE I. DRILL TO BELOW HEADSHANK JUNCTURE.

SELECT DRILL IN ACCORDANCE WITH TABLE II. DRILL TO DEPTH OF PILOT HOLE.

WITH HAMMER AND NOMINAL SIZE PUNCH, SEVER HEAD AND DRIVE OUT SHANK AND BLIND HEAD.

REMOVAL WHEN BOLT TURNS IN HOLE WHILE DRILLING



PREVENT NUT FROM TURNING BY ENGAGING DRIVING TOOL NOSE ADAPTER. HOLD NOSE ADAPTER WITH HAND TOOL HANDLE OR VISE-GRIP PLIERS.

SELECT DRILL IN ACCORDANCE WITH TABLE I. DRILL THROUGH SHANK, SEVERING BOLTHEAD.

PICK NUT OUT OF HOLE WITH PUNCH.

SELECT DRILL WITH 500 RPM MAXIMUM

	TABLE I	TABLE II
FASTENER DIA	DRILL SIZE	DRILL SIZE
5/32	NO. 43 (0.089)	5/32 (0.1562)
3/16	NO. 35 (0.110)	12 (0.189)
1/4	NO. 24 (0.152)	D (0.246)
5/16	NO. 17 (0.173)	M (0.295)
3/8	NO. 5 (0.2055)	23/64 (0.3594)

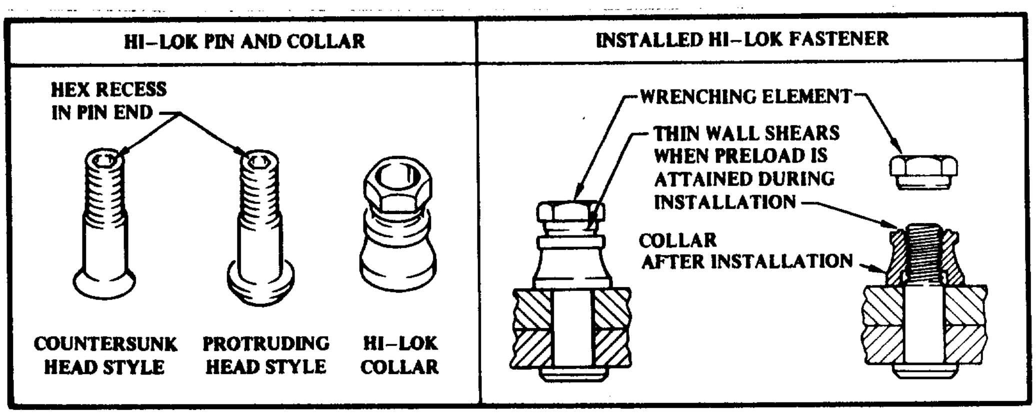
Blind Fasteners - Threaded Sleeve (Jo-Bolt)
Figure 2 (Sheet 4 of 4)

S265-3-61 A

STRUCTURAL IDENTIFICATION (Continued)

THREADED PIN FASTENERS (HI-LOK)

Hi-Lok fasteners (figure 3) are a threaded-pin type fastener with a self-torquing nut that automatically shears the wrenching head off when the proper torque value is reached. The nuts or collars are obtainable in either aluminum or stainless-steel alloys, and the pins are obtainable in various alloys, such as steel, titanium, and aluminum. Aluminum alloy pins and collars may be used as replacement for DD6 rivets or where higher shear allowables are necessary than can be obtained with the conventional DD6 rivets. Advantages of the Hi-Lok fasteners are that they can be held and torqued from the same side with either the special driving tool or with a hex Allen wrench and an open-end or box wrench. Another distinct advantage is the absence of heavy driving blows during installation. Hi-Loks may be procured with either a 100° countersunk head or a modified flat head. Refer to tables 1 and 2 for rivet head style, type, and part numbers. Refer to Source Key 021 in 51-30-00, table 2 for manufacturer.



Hi-Lok Fastener
Figure 3

Table 1. Protruding Head Hi-Lok Fastener Selection

HI-LOK FASTENERS						
HEAD STYLE AND TYPE	BASIC PART NO.		MATERIAL		SHEAR STRENGTH (KSI MIN)	MAX SERVICE TEMP (°F)
	PIN	MATING COLLAR	PIN	COLLAR		
PROTRUDING HEAD SHEAR B	HL10V	HL70	6AL–4V	2024–T6	95	325
	HL10V	HL82–( ) ADW A	6AL–4V	2024–T6		
	HL10V	HL94DU	6AL–4V	303	95	600
	HL40	HL94DU	A–286	303	95	700
	HL40	HL175DU –( )ADW A	A–286	303	95	700
	HL40	HL97DJ	A–286	A–286	95	1200
	HL40	HL185DU –( )ADW A	A–286	A–286	95	1200
	HL644LL	HL94DU	PH13–8Mo	303	125	600
	HL644LL	HL175DU –( )ADW A	PH13–8Mo	303		
	HE111–0011	HE114–0032	STEEL	2024–T6	95	325
	HE111–0018	HE114–0032	431	2024–T6	125	325
	HE111–0027	HE114–0032	431	2024–T6		
	ME112–0013	MD114–0022	6AL–4V	2024–T6	95	350
	ME112–0013	ME114–0024 A	6AL–4V	2024–T6		
PROTRUDING HEAD TENSION	HL12V	HL73DY	6AL–4V	17–4PH	95	600
	HL12V	HL89 DU –( )ADW A	6AL–4V	17–4PH		
	HL48	HL78	A–286	A–286	95	1200
	HL646LL	HL73DY	PH13–8Mo	17–4PH	125	600
	HL646LL	HL89DU ( )ADW A	PH13–8Mo	17–4PH		
	ME112–0006	ME114–0019	A–286	A–286	95	1200
	ME112–0006	ME114–0020 A	A–286	A–286		

NOTES

A SELF-ALIGNING COLLAR ASSEMBLY. FOR USE ON SLOPED SURFACES UP TO 7° MAXIMUM.

B HI-LOK SHEAR HEAD FASTENERS SHALL NOT BE USED IN TENSION APPLICATIONS.

Table 2. Flush Head Hi-Lok Fastener Selection

HEAD STYLE AND TYPE	BASIC PART NO.		MATERIAL		SHEAR STRENGTH (KSI MIN)	MAX SERVICE TEMP (°F)
	PIN	MATING COLLAR	PIN	COLLAR		
100° FLUSH HEAD SHEAR [B]	HL11V	HL70	6AL–4V	2024–T6	95	325
	HL11V	HL82–( ) ADW [A]	6AL–4V	2024–T6		
	HL11V	HL94DU	6AL–4V	303	95	600
	HL41	HL94DU	A–286	303	95	700
	HL41	HL175DU –( )ADW [A]	A–286	303		
	HL41	HL97DJ	A–286	A–286	95	1200
	HL41	HL185DU –( ) ADW) [A]	A–286	A–286		
	HL645LL	HL94DU	PH13–8Mo	303	125	600
	HL645LL	HL175DU –( )ADW [A]	PH13–8Mo	303		
	HE111–0015	HE114–0032	STEEL	2024–T6	95	325
	HE111–0019	HE114–0032	431	2024–T6	125	325
	HE111–0028	HE114–0032	431	2024–T6	125	325
	ME112–0014	ME114–0022	6AL–4V	2024–T6	95	350
	ME112–0014	ME114–0024 [A]	6AL–4V	2024–T6		
100° FLUSH HEAD TENSION	HL13V	HL73DY	6AL–4V	17–4PH	95	600
	HL13V	HL89DU –( )ADW [A]	6AL–4V	17–4PH		
	HL49	HL78	A–286	A–286	95	1200
	HL647LL	HL73DY	PH13–8Mo	17–4PH	125	600
	HL647LL	HL89DU –( )ADW [A]	PH13–8Mo	17–4PH		
	ME112–0007	ME114–0019	A–286	A–286	95	1200
	ME112–0007	ME114–0020 [A]	A–286	A–286		

NOTES

[A] SELF ALIGNING COLLAR ASSEMBLY. FOR USE ON SLOPED SURFACES UP TO 7° MAXIMUM.

[B] HI-LOK SHEAR HEAD FASTENERS SHALL NOT BE USED IN TENSION APPLICATIONS.

STRUCTURAL IDENTIFICATION (Continued)

SCREWS

Rockwell International 7S series special screws are high-strength, close-tolerance fasteners with Torq-Set heads. These screws are used extensively in the wing panels and other structural components. Most of these screws have a standard diameter. However, when necessary for salvage purposes, screws having either a 0.015- or a 0.031 in. oversize shank are used. Table 3 shows the thread size and part numbers for standard diameter and oversize 7S34 screws. The part number of each screw is stamped on the head.

Oversize screws must be replaced with oversize screws of the same diameter. Using a standard screw in place of an oversize screw will result in weakened structure. In addition, if the screw is used in a sealed area, a poor seal will result.

Because these screws are similar in appearance, the only sure method of identification is the number on the head. Screws should be checked carefully before being replaced.

See figure 4 for 7S34 and 7S39 screw description.

Table 3. 7S34 Oversize Screws

THREAD	STD DIA	OVERSIZE SHANK	
		0.015 IN.	0.031 IN.
10-32 NF-3A	7S34-3	7S34-31	7S34-32
1/4-28 UNF-3A	7S34-4	7S34-41	7S34-42
5/16-24 UNF-3A	7S34-5	7S34-51	7S34-52
3/8-24 UNF-3A	7S34-6	7S34-61	7S34-62
7/16-20 UNF-3A	7S34-7	7S34-71	7S34-72
1/20 UNF-3A	7S34-8	7S34-81	7S34-82
9/16-18 UNF-3A	7S34-9	7S34-91	7S34-92

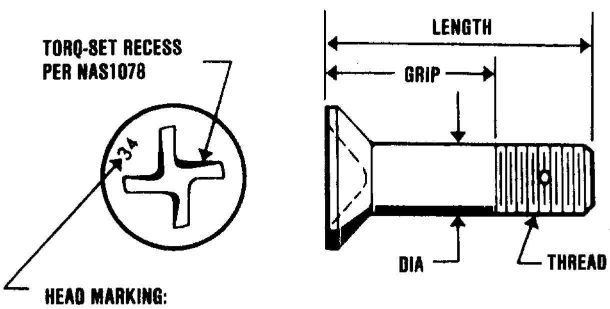
NOTES

- LENGTH CODE: LAST DASH NUMBER INDICATES NOMINAL GRIP LENGTH IN 16THS.
- EXAMPLE OF PART NUMBERS: 7S34-41-10 INDICATES A 1/4-28 TORQ-SET RECESS SCREW WITH A 0.015 IN. OVERSIZE SHANK AND 5/8 IN. NOMINAL GRIP LENGTH.
- REFER TO SOURCE KEY 017 IN 51-30-00 TABLE 2 FOR MANUFACTURER.

NOTE

DIMENSIONS SHOWN ARE IN INCHES UNLESS OTHERWISE NOTED.

7S34 SCREW



HEAD MARKING:
MANUFACTURER'S TRADEMARK AND 34 TO INDICATE BASIC PART NUMBER. MARK "C" TO INDICATE A286 CRES, "J" TO INDICATE H-11 STEEL WHERE APPLICABLE. NO LETTER INDICATES 4130 STEEL.

BASIC NO.	DIAMETER	THREAD
7S34-3	10	32
7S34-4	1/4	28
7S34-5	5/16	24
7S34-6	3/8	24
7S34-7	7/16	20
7S34-8	1/2	20
7S34-9	9/16	18
7S34-10	5/8	18

EXAMPLES

7S34-4-8=1/4 DIA SCREW, 0.500 GRIP, 4130 STEEL WITH COTTER PIN HOLE.

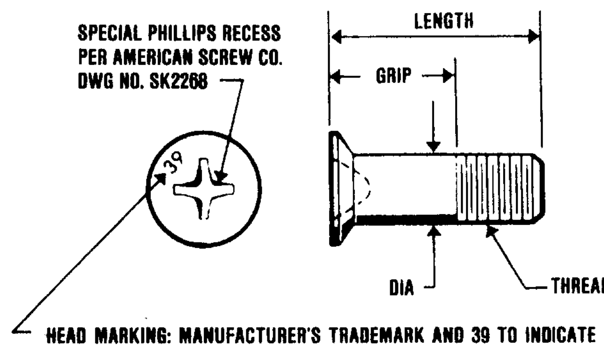
7S34CT5A10=5/16 DIA SCREW, 0.625 GRIP, A286 STEEL WITHOUT COTTER PIN HOLE

7S34J6-12=3/8 DIA SCREW, 0.750 GRIP, H-11 STEEL WITH COTTER PIN HOLE

7S34J61-41=3/8 DIA SCREW, 0.015 OVERSIZE SHANK DIA, 0.875 GRIP, H-11 STEEL WITH COTTER PIN HOLE.

100° FLUSH HEAD, TORQ-SET, CLOSE-TOLERANCE

7S39 SCREW



HEAD MARKING: MANUFACTURER'S TRADEMARK AND 39 TO INDICATE BASIC PART NUMBER. MARK "C" TO INDICATE A286 CRES WHERE APPLICABLE. NO LETTER INDICATES ALLOY STEEL.

BASIC NO.	DIAMETER	THREAD
7S39-3	10	32
7S39-4	1/4	28
7S39-5	5/16	24
7S39-6	3/8	24
7S39-7	7/16	20
7S39-8	1/2	20
7S39-9	9/16	18

EXAMPLES

7S39-4-8=1/4 DIA SCREW, 0.500 GRIP, ALLOY STEEL WITH COTTER PIN HOLE.

7S39C5A10=5/16 DIA SCREW, 0.625 GRIP, A286 STEEL WITHOUT COTTER PIN HOLE

7S39C61-14=3/8 DIA SCREW, 0.015 OVERSIZE SHANK DIA 0.875 GRIP, A286 STEEL WITH COTTER PIN HOLE.

100° FLUSH HI-SHEAR HEAD, SPECIAL PHILLIPS RECESS, CLOSE-TOLERANCE

NOTES

- THIS SCREW FOR USE ON T-39 AIRPLANE ONLY.
- THIS SCREW TO BE USED WITH LOW-HEIGHT NUTS AND FOR APPLICATIONS INVOLVING SHEAR LANDING PRIMARILY.

7S Series Special Fasteners
Figure 4

STRUCTURAL REPAIR (Continued)

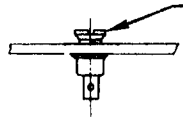
TURNLOCK FASTENERS

The Camloc type turnlock fastener consists of a receptacle that is riveted to the structure and a stud assembly that is secured to the outer panel by a grommet and snap ring. The stud locks positively in the receptacle with a quarter turn that engages the cross pin in a locked position in the cam of the receptacle. Typical appearance and nomenclature for the various parts are shown in figure 5.

The standard Camloc 4002 series stud assembly is cadmium plated steel. The receptacle is corrosion resistant steel, and is limited to a maximum service temperature of 450°F because of the cadmium plate on the stud assembly. Corrosion resistant steel stud assemblies are available where service temperatures of 700°F are encountered. See figure 6 for installation and removal information.

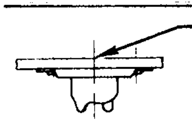
CAMLOC 4002 SERIES FASTENER CALLOUT

PANEL WITH STUD ASSY



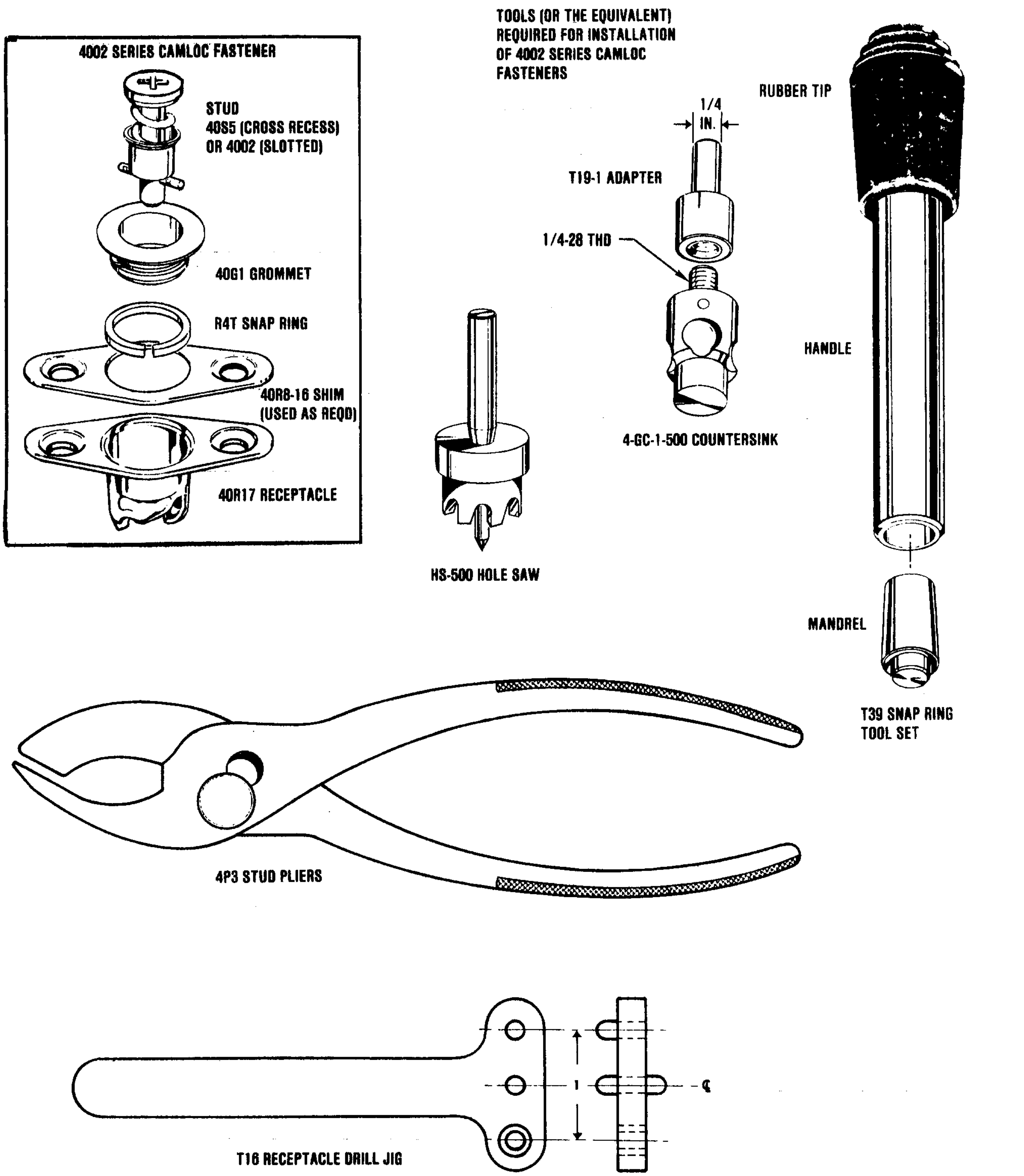
40G1— .... REQD (Grommet)
4002— .... REQD (Stud)
4002—SW ...... REQD (Washer, for stud dash numbers — 16 and longer)
R4T .... REQD (Ring)

SUBSTRUCTURE WITH RECEPTACLE



40R17—1 .... REQD (Receptacle, fixed, plain rivet holes)
40R17—2 .... REQD (Receptacle, fixed, dimpled rivet holes)
40R8—16—1 .... REQD (Shim may be required)

Camloc Fastener
Figure 5

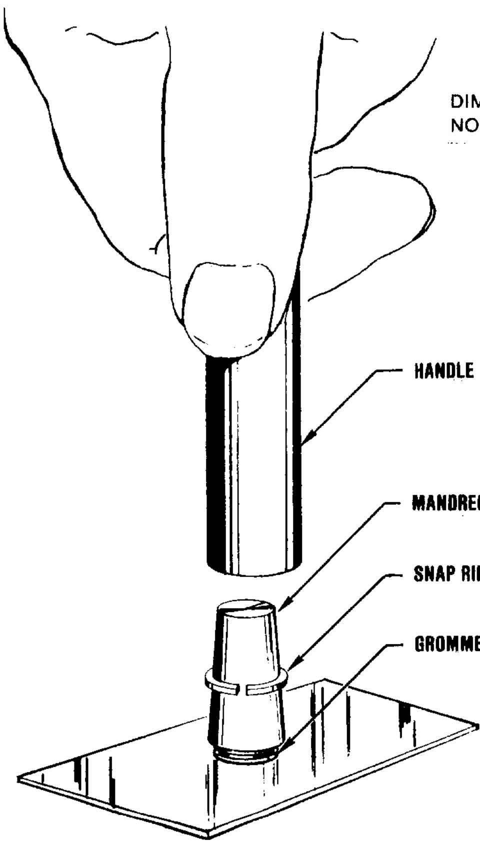


S265-3-62

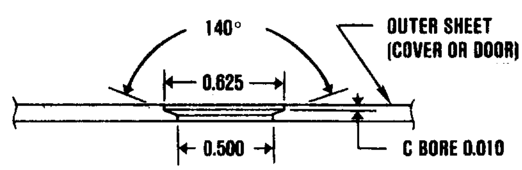
Camloc Fastener Installation
Figure 6 (Sheet 1 of 4)

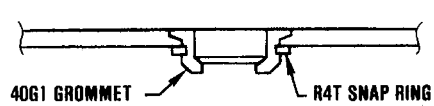
NOTE

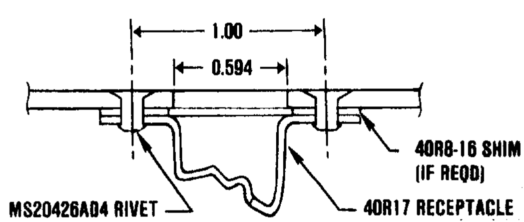
DIMENSIONS SHOWN IN INCHES UNLESS OTHERWISE NOTED.

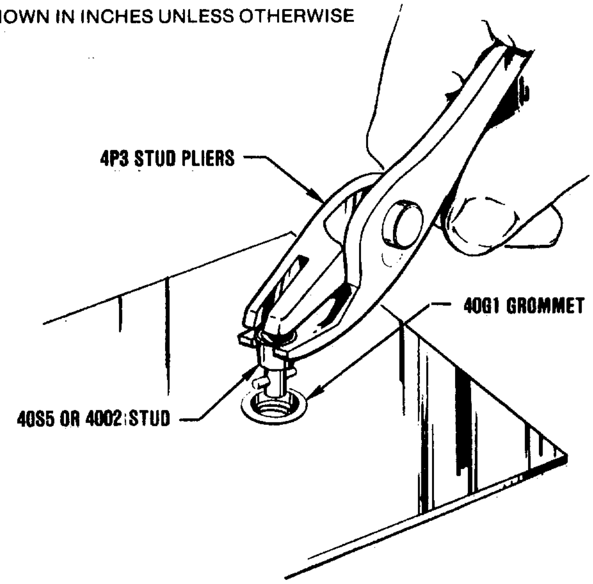


INSTALLING GROMMET









INSTALLING STUD

PREPARATION FOR INSTALLATION AND INSTALLATION OF GROMMET AND STUD

1 Drill No. 30 (0.1285 in.) diameter pilot hole.

2 Enlarge pilot hole with Camloc saw No. HS-500 or its equal. If final hole size is to be accomplished by drilling, No. 30 pilot hole should first be enlarged to 3/16 in.

3 Using Camloc tool No. 4-GC-1-500 or its equal, countersink face of panel.

4 Insert 40G1 grommet, and, using Camloc tool No. T39, attach R4T snap ring.

5 Using Camloc 4P3 stud pliers, install 40S5 or 4002 stud.

PREPARATION FOR INSTALLATION AND INSTALLATION OF RECEPTACLE

1 Locate and pilot-drill center (No. 30) hole.

2 Locate and drill 1/8 in. rivet holes. Locate holes with Camloc tool No. T16 or its equal. Countersink for 1/8 in. rivet.

3 Enlarge center pilot-drilled hole to 3/16 in. and finish-drill hole until final hole size is 19/32 in.

4 Using MS20426AD4 rivets, install receptacle. Use 40R8-16 receptacle shims, when necessary, to meet minimum thickness requirements.

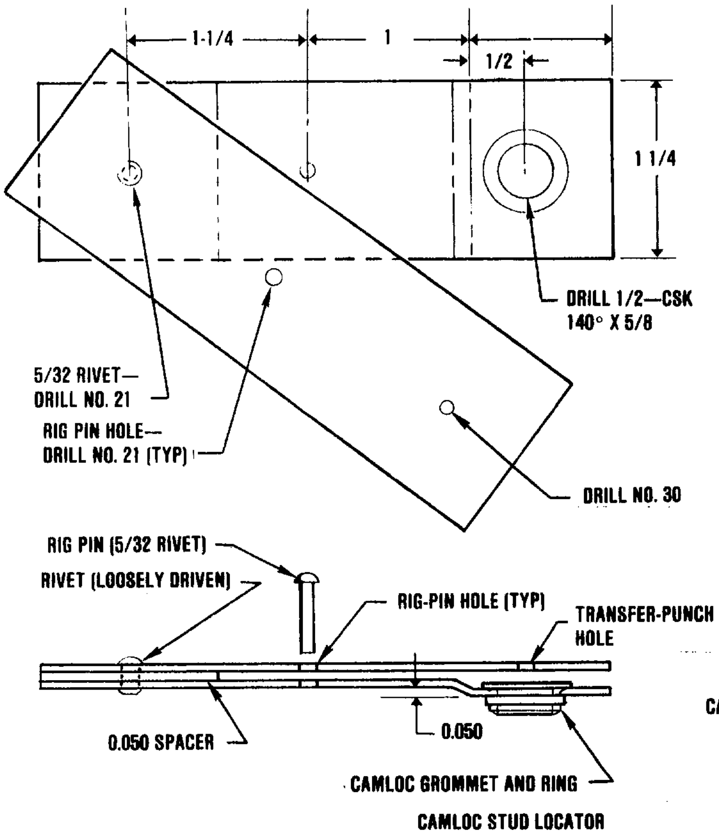
S265-3-63

Camloc Fastener Installation
Figure 6 (Sheet 2 of 4)

CAMLOC SHEAR GROMMET PART NO.		
PART NO.	OUTER SHEET THICKNESS (IN.)	INNER SHEET MINIMUM THICKNESS INNER SHEET (PLUS 40R8-16 SHIMS WHEN NECESSARY) (IN.)
40G1-5	0.050	0.071
40G1-5	0.063	0.063
40G1-6	0.071	0.063
40G1-6	0.080	0.050
40G1-8	0.090	0.063
40G1-8	0.100	0.050
40G1-10	0.112	0.063

DASH NO. FOR 40S5 AND 4002 CAMLOC STUDS FOR FIXED-TYPE RECEPTACLE 40R17					
PART NO.	GRIP INNER MEMBER PLUS OUTER MEMBER IN.	LENGTH "L" IN.	PART NO.	GRIP INNER MEMBER PLUS OUTER MEMBER IN.	LENGTH "L" IN.
4002-3	0.111–0.140	0.710	4002-15	0.471–0.500	1.070
4002-4	0.141–0.170	0.740	4002-16	0.501–0.530	1.100
4002-5	0.171–0.200	0.770	4002-17	0.531–0.560	1.130
4002-6	0.201–0.230	0.800	4002-18	0.561–0.590	1.160
4002-7	0.231–0.260	0.830	4002-19	0.591–0.620	1.190
4002-8	0.261–0.290	0.860	4002-20	0.621–0.650	1.220
4002-9	0.291–0.320	0.890	4002-21	0.651–0.680	1.250
4002-10	0.321–0.350	0.920	4002-22	0.681–0.710	1.280
4002-11	0.351–0.380	0.950	4002-23	0.711–0.740	1.310
4002-12	0.381–0.410	0.980	4002-24	0.741–0.770	1.340
4002-13	0.411–0.440	1.101	4002-25	0.771–0.800	1.370
4002-14	0.441–0.470	1.040			

Camloc Fastener Installation
Figure 6 (Sheet 3 of 4)



FABRICATION

1 Fabricate all parts from 0.050 in. 2024-T4 or 7075-T6 clad material.

2 Cut sheet-metal strips and spacers.

3 Joggle lower (collar-retaining) strip.

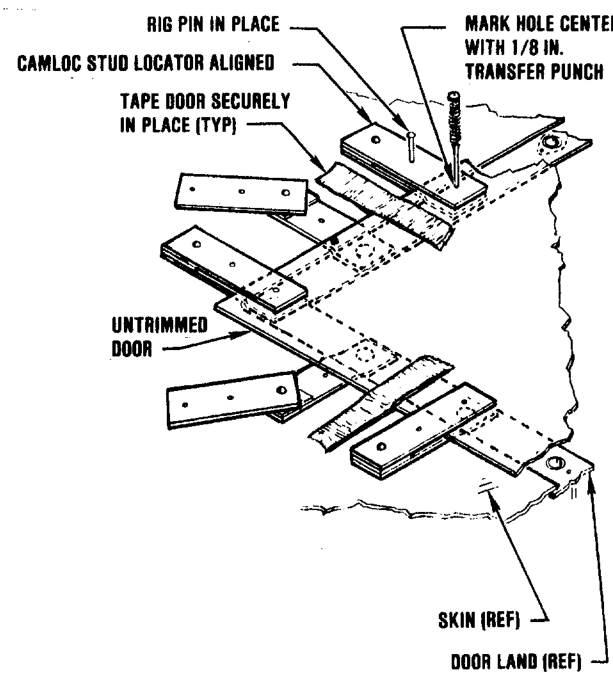
4 Align and clamp strips and 0.050 in. spacer in drill vise, and insert a 0.100 in. spacer between strips at joggled end.

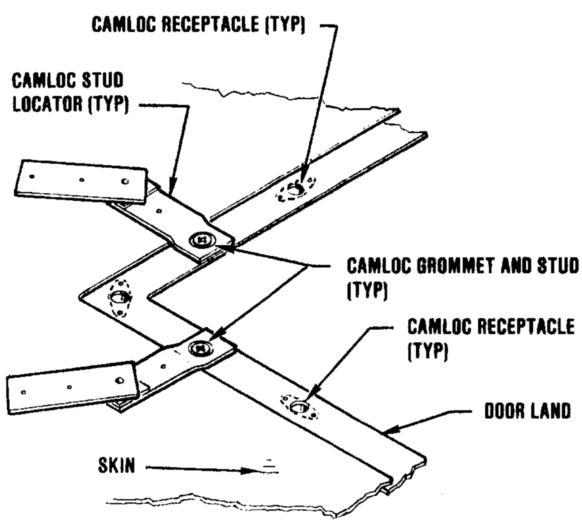
5 Through all parts, drill a No. 21 rivet hole, a No. 21 rig-pin hole, and a No. 30 transfer-punch hole.

6 Remove upper strip and spacers from vise. Reclamp lower strip; drill and coutnersink 1/2 in. Camloc collar hole.

7 Install Camloc collar.

8 Assemble parts, and rivet them. To ensure alignment, rig pin should be in place during riveting operation.





NOTES

- THIS TYPE OF CAMLOC STUD LOCATOR IS RECOMMENDED WHEN REGULAR REPLACEMENT OF DOORS AND COVERS IS EXPECTED. A LOCATOR IS INSTALLED IN EACH CAMLOC RECEPTACLE UNDER DOOR OR COVER BEING FITTED. (LARGEST DOOR HAS 26 CAMLOC FASTENERS.)
- DIMENSION SHOWN IN INCHES UNLESS OTHERWISE NOTED.

LOCATING CAMLOC STUDS

1 INSTALL CAMLOC STUD LOCATOR IN EACH RECEPTACLE AROUND OPENING.

2 ALIGN UNTRIMMED DOOR OVER OPENING, AND SECURELY TAPE IT IN PLACE.

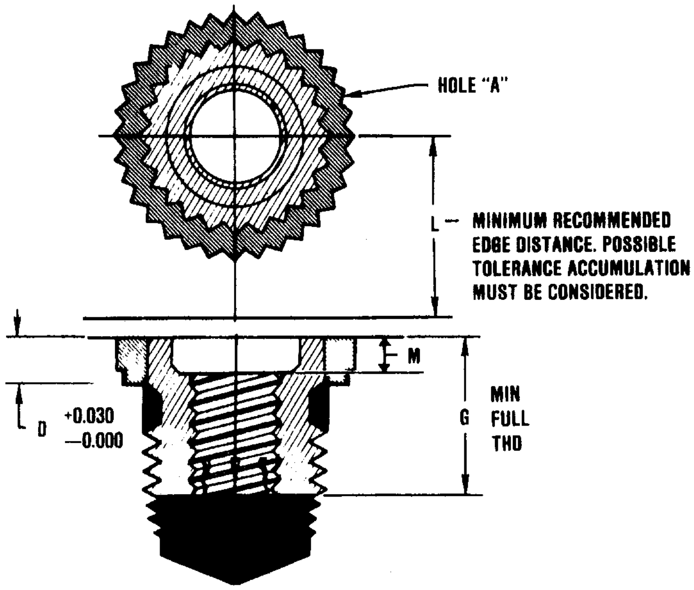
3 ALIGN LOCATOR, INSTALL RIG PIN, AND MARK CENTER OF STUD LOCATION. REPEAT PROCEDURE ON EACH LOCATOR AROUND OPENING.

Camloc Fastener Installation
Figure 6 (Sheet 4 of 4)

STRUCTURAL IDENTIFICATION (Continued)

THREADED INSERTS

See figure 7 for installation and removal information for Rosan threaded inserts.



INSTALLING INSERT

1 Drill hole shown in column "A" to depth shown in column "B."

2 Counterbore diameter shown in column "C" (+0.003, −0.000 in.), to depth shown in column "D." Fillet radius 0.010 to 0.020 in. Counterbore to be concentric with thread pitch diameter within 0.006 in. total indicator reading.

3 Countersink 90° to full diameter of counterbore.

4 Tap for thread size shown in column "K" to depth shown in column "G."

5 Select applicable insert from column "H." Install from 0.010 to 0.020 in. below surface.

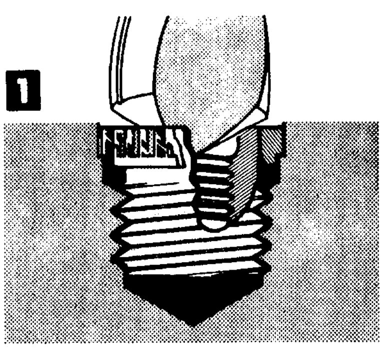
6 Select applicable lock ring from column "J." Install from flush to 0.010 in. below surface.

CODE: LAST DASH NUMBER INDICATES LENGTH IN 1/16THS. WHEN LOCKING FEATURE IS NOT REQUIRED, OMIT LETTER "L" AFTER PART NUMBERS. EXAMPLE: RD206SB-8

INSERT INTERNAL THREAD	TAP DRILL A	DRILL DEPTH B	CBORE DIA C		CBORE DEPTH D	MIN FULL THD G	INSERT PART NUMBER H	LOCK RING PART NUMBER J	TAP THREAD K	MIN EDGE DISTANCE L	CBORE FOR AN BOLT M	REMOVAL DRILL X
			AL ALLOY	MAG								
4-40 NC-3B	25(0.149)	15/32	0.250	0.258	0.094	1/4	R102SB-4L	RL16SB-5	10-24 NC-3B	11/64	—	11/64
6-32 NC-3B	18(0.177)	17/32	0.281	0.290	0.109	5/16	R103SB-5L	RL18SB-6	12-24 NC-3	13/64	—	13/64
8-32 NC-3B	7(0.201)	9/16	0.328	0.337	0.109	3/8	R104SB-6L	RL21SB-6	1/4-20 UNC-3B	7/32	—	15/64
10-32 NF-3B	F(0.257)	19/32	0.375	0.381	0.140	11/32	RD205SB-5.5L	RL24SB-7	5/16-18 UNC-3B	1/4	0.062	9/32
1/4-28 UNF-3B	5/16	21/32	0.438	0.448	0.156	13/32	RD206SB-6.5L	RL28SB-8	3/8-16 UNC-3B	5/16	0.080	11/32
5/16-24 UNF-3B	27/64	23/32	0.516	0.526	0.172	15/32	RAD207SB-7.5L	RL33SB-9	1/2-13 UNC-3B	3/8	0.095	27/64
3/8-24 UNF-3B	31/64	13/16	0.594	0.601	0.172	9/16	RD2098SB-9L	RL38SB-9	9/16-12 UNC-3B	7/16	0.100	31/64
7/16-20 UNF-3B	17/32	13/16	0.734	0.747	0.188	9/16	RD2089SB-9L	RL47SB-10	5/8-11 UNC-3B	1/2	0.100	19/32
1/2-20 UNF-3B	41/64	15/16	0.875	0.888	0.203	11/16	RD210SB-11L	RL56SB-11	3/4-10 UNC-3B	5/8	0.109	23/32

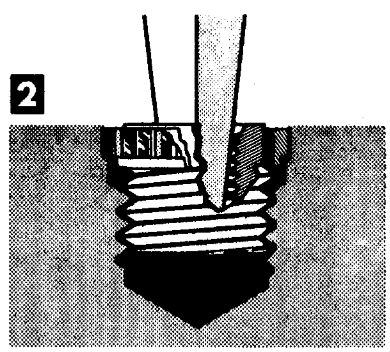
REMOVING INSERT

1



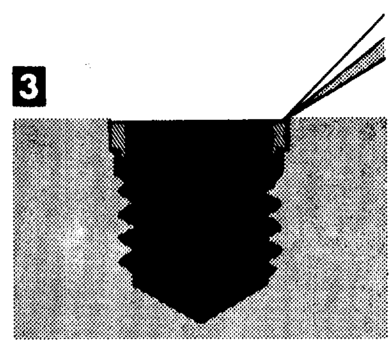
DRILL OUT SERRATED COLLAR OF INSERT. USE DRILL SAME DIAMETER AS SERRATIONS. DRILL TO DEPTH OF LOCK RING ONLY. USE DRILL AT HIGH SPEED. FOR CORRECT DRILL SIZES, SEE COLUMN "X" IN TABLE ABOVE.

2



DRIVE IN SQUARE-TYPE "EASE-OUT" TOOL OR SIMILAR SQUARE TOOL. SCREW OUT INSERT.

3



IF LOCK RING FAILS TO COME OUT AS INSERT IS UNSCREWED, COLLAPSE REMAINING PORTION OF RING WITH PUNCH AND REMOVE.

NOTE

DIMENSIONS SHOWN ARE IN INCHES.

S265-3-66

Rosan Inserts
Figure 7 (Sheet 1 of 2)

NOTES

- OPERATIONS **1**, **2**, AND **3** CAN BE COMBINED INTO ONE OPERATION BY USING A CHAMFERED STEP DRILL.
- OPERATIONS **2** AND **3** CAN BE COMBINED INTO ONE OPERATION BY USING A CHAMFERED COUTNER-BORE TOOL WITH PILOT.
- ALL OPERATIONS MAY BE ACCOMPLISHED WITH SEPARATE TOOLS.

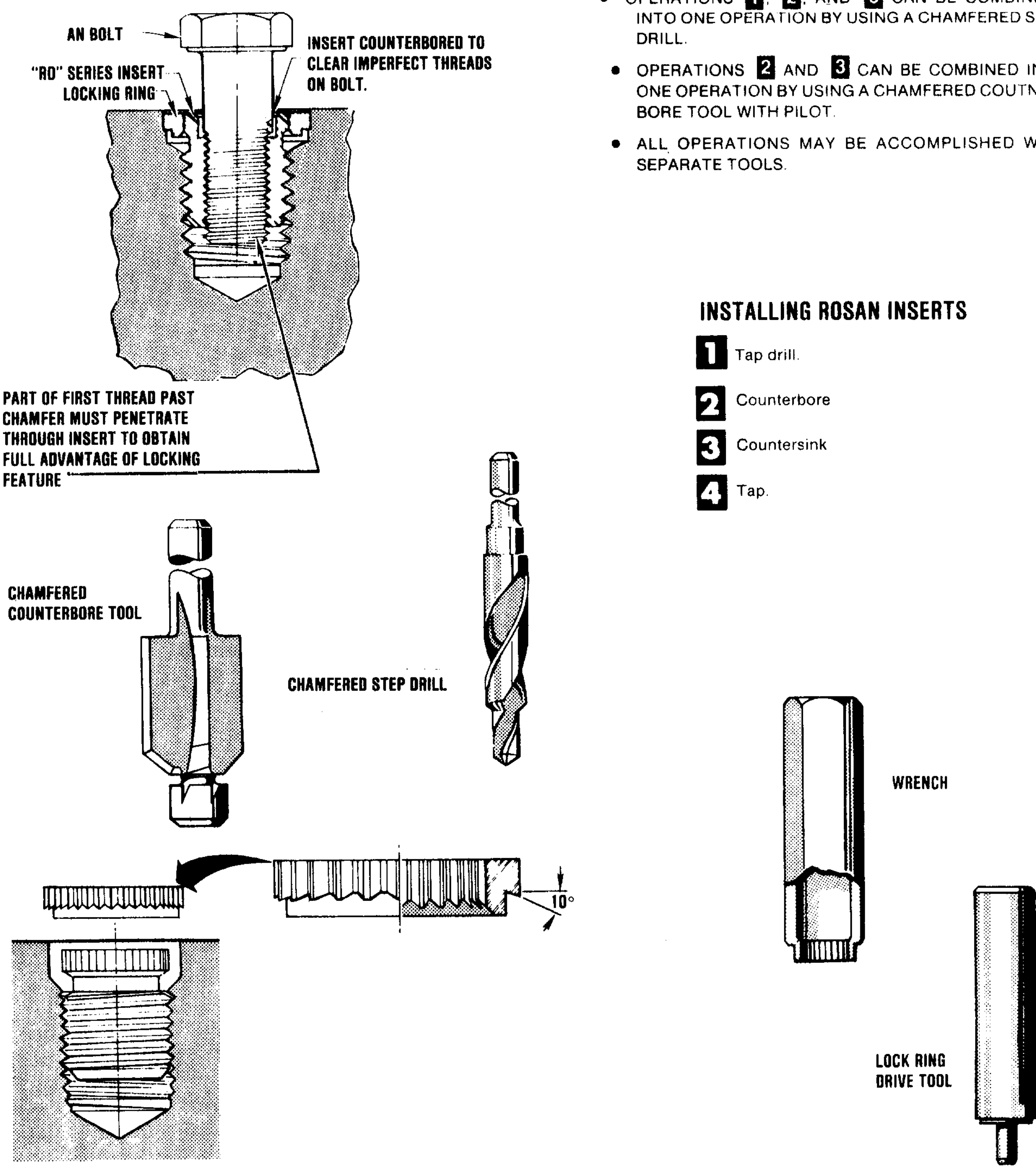
INSTALLING ROSAN INSERTS

1 Tap drill.

2 Counterbore

3 Countersink

4 Tap.



NOTE

LOCK RING IS DESIGNED TO BROACH ITS OWN WAY INTO PARENT MATERIAL. RING SHOULD BE DRIVEN STRAIGHT WITH FLAT TOOL.

NOTE

SEQUENCES OF OPERATION FOR INSTALLATION OF ROSAN INSERTS.

S265-3-67

Rosan Inserts
Figure 7 (Sheet 2 of 2)

REPAIR SUPPORT AND ALIGNMENT

STRUCTURAL IDENTIFICATION

GENERAL

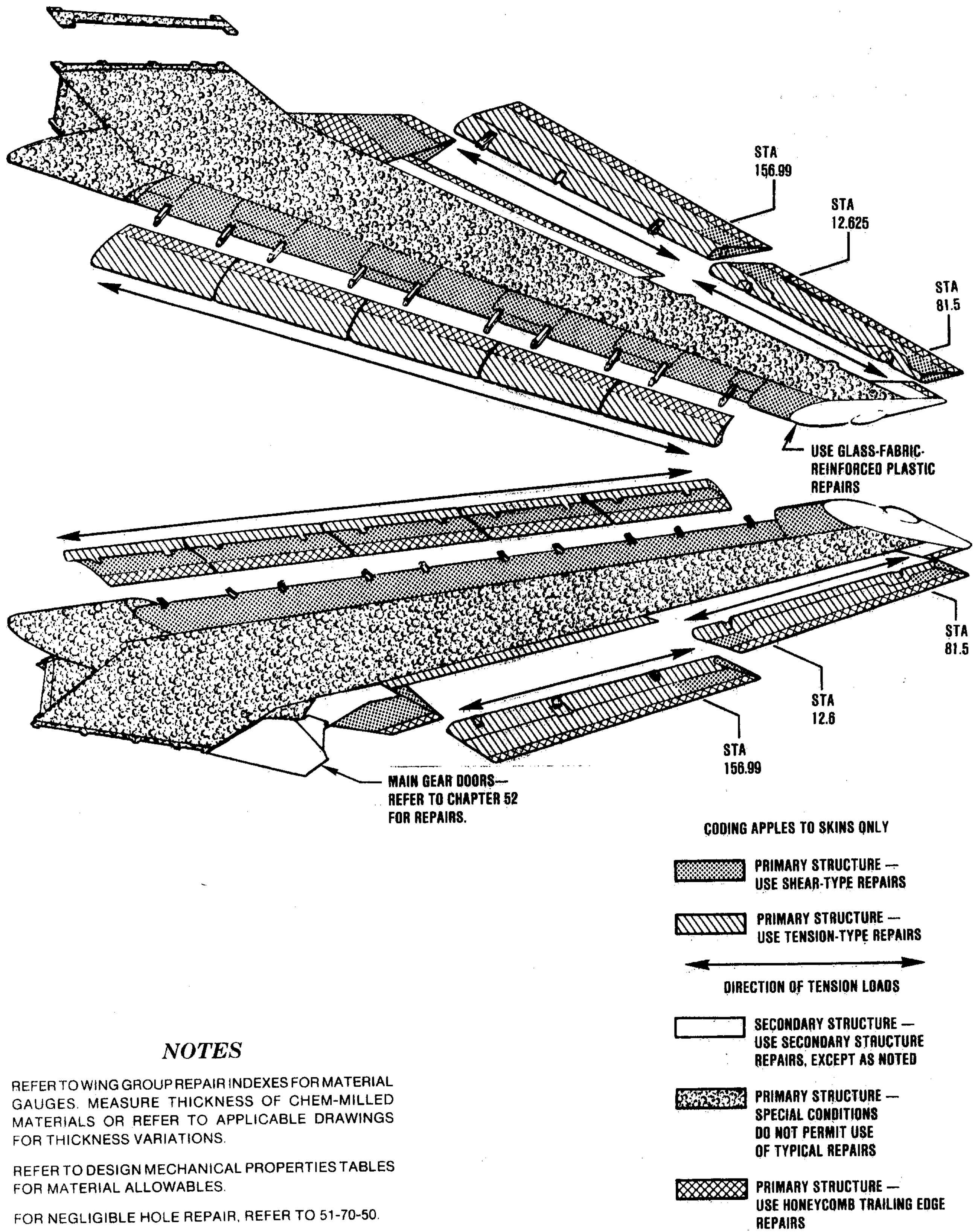
Refer to the applicable chapter for the required support of the structural components.

TYPICAL REPAIRS

STRUCTURAL IDENTIFICATION

GENERAL

Repair data in this section presents information which enables development of repairs for various airframe areas by shop personnel. This data consists of illustrations which show examples of repair problems and methods of solution. The typical repair index is presented in figure 1. Use of clad instead of bare aluminum alloy is preferred for all repairs as an additional step for corrosion protection.



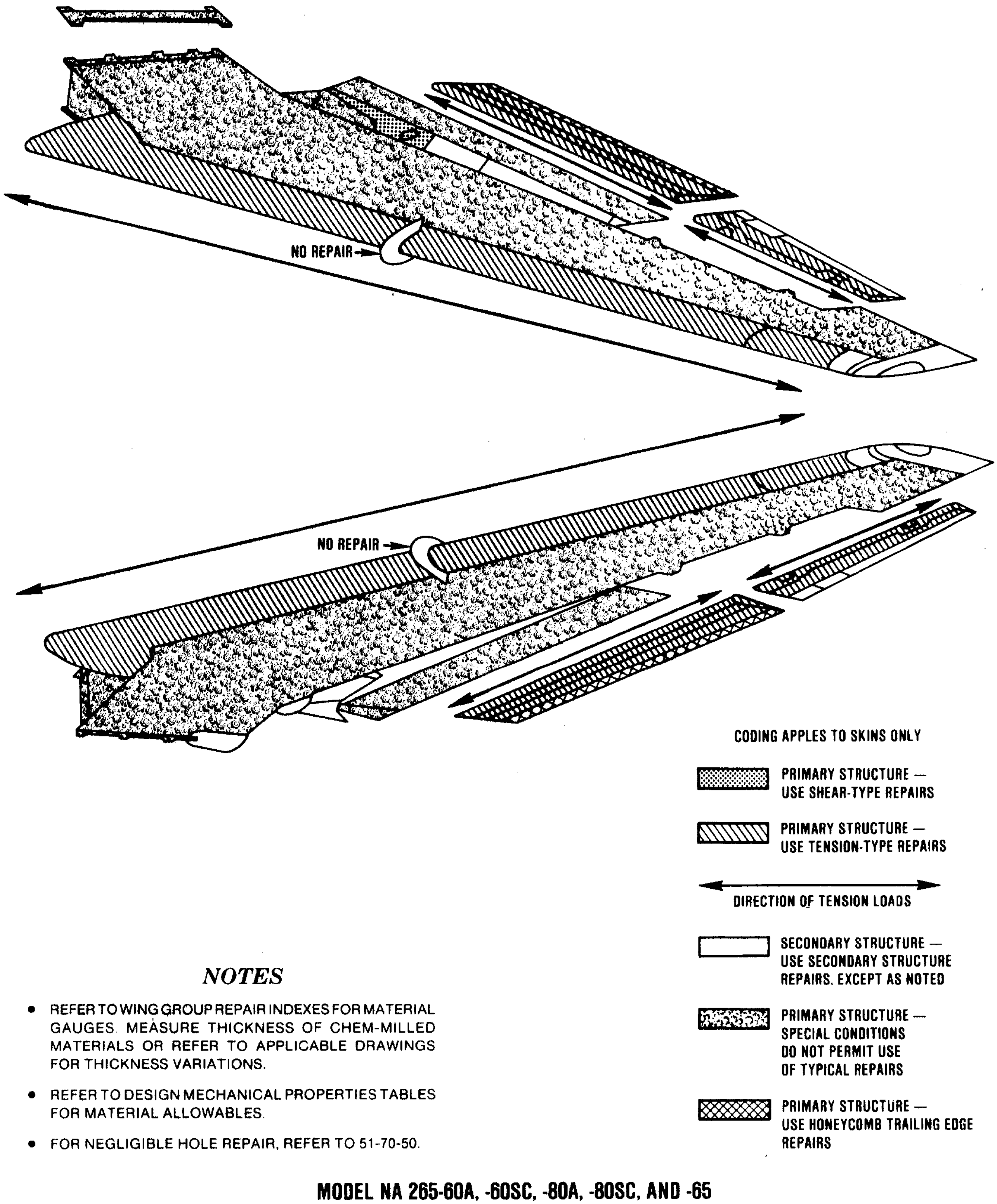
NOTES

- REFER TO WING GROUP REPAIR INDEXES FOR MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50.

MODEL NA 265-40, -60, -70, AND -80

S265-3-73A

Typical Repair Index
Figure 1 (Sheet 1 of 9)

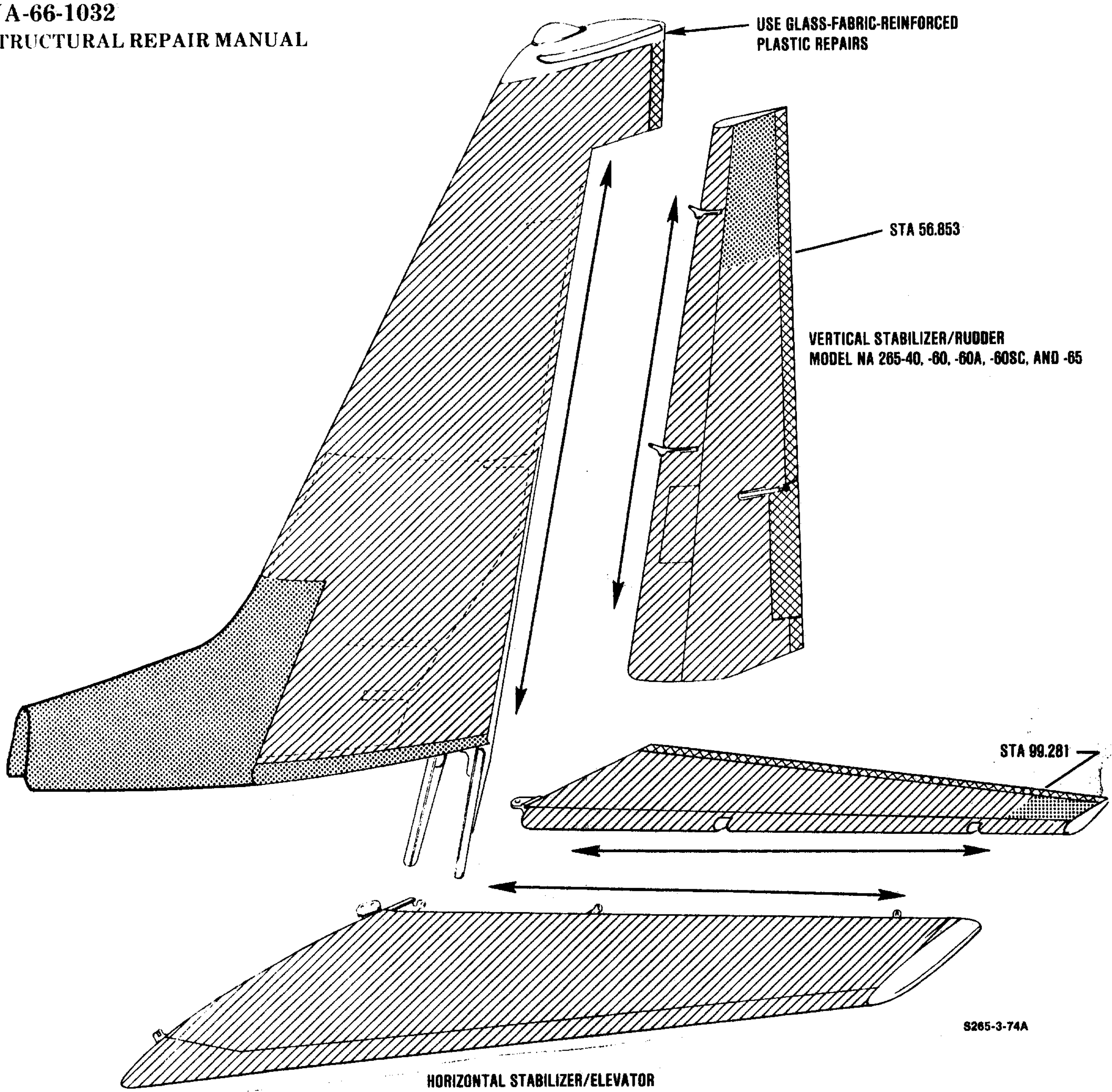


NOTES

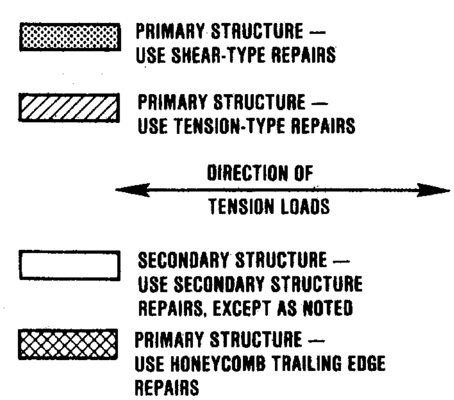
- REFER TO WING GROUP REPAIR INDEXES FOR MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50.

MODEL NA 265-60A, -60SC, -80A, -80SC, AND -65

Typical Repair Index
Figure 1 (Sheet 2 of 9)



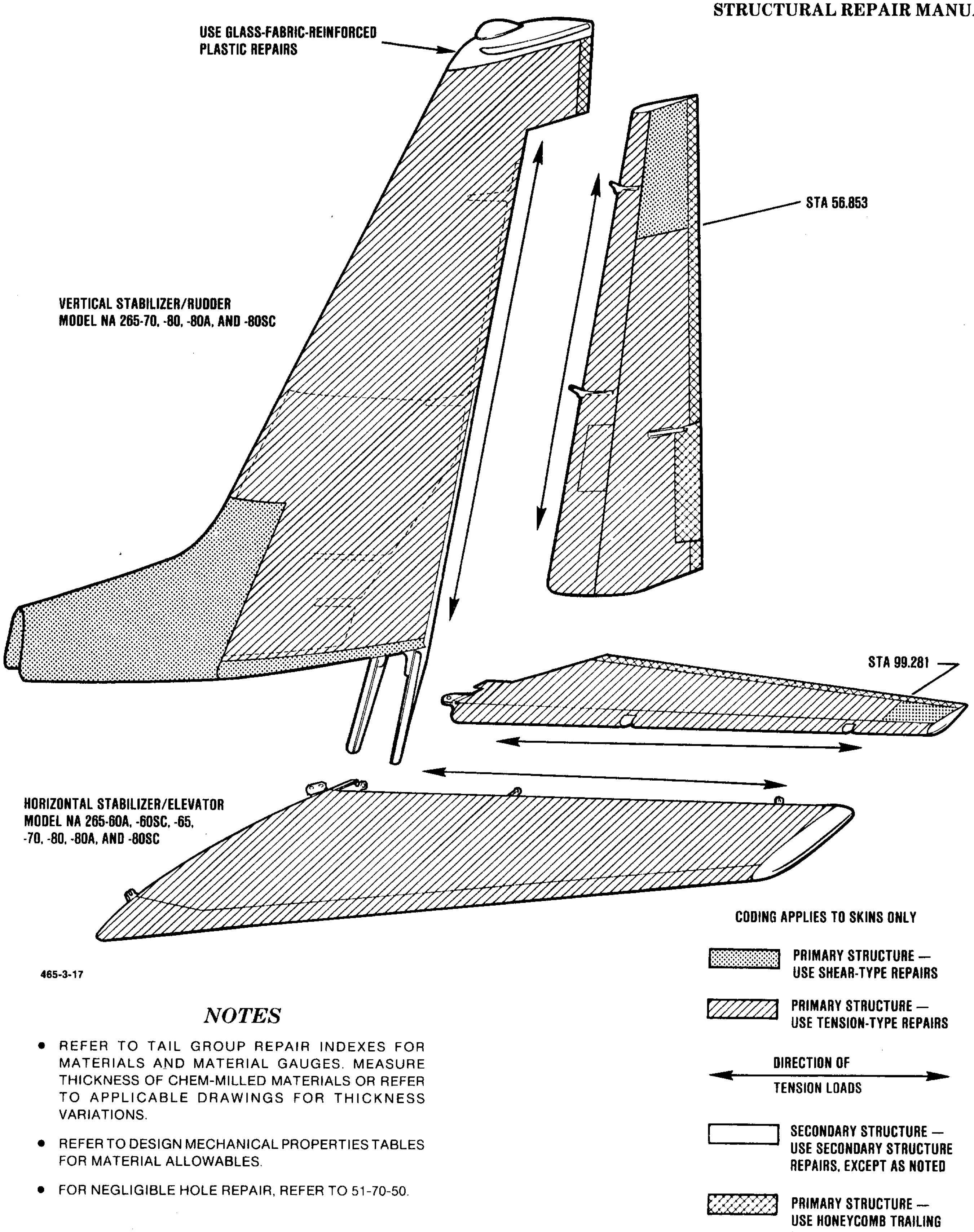
CODING APPLIES TO SKINS ONLY



NOTES

- REFER TO TAIL GROUP REPAIR INDEXES FOR MATERIALS AND MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50.

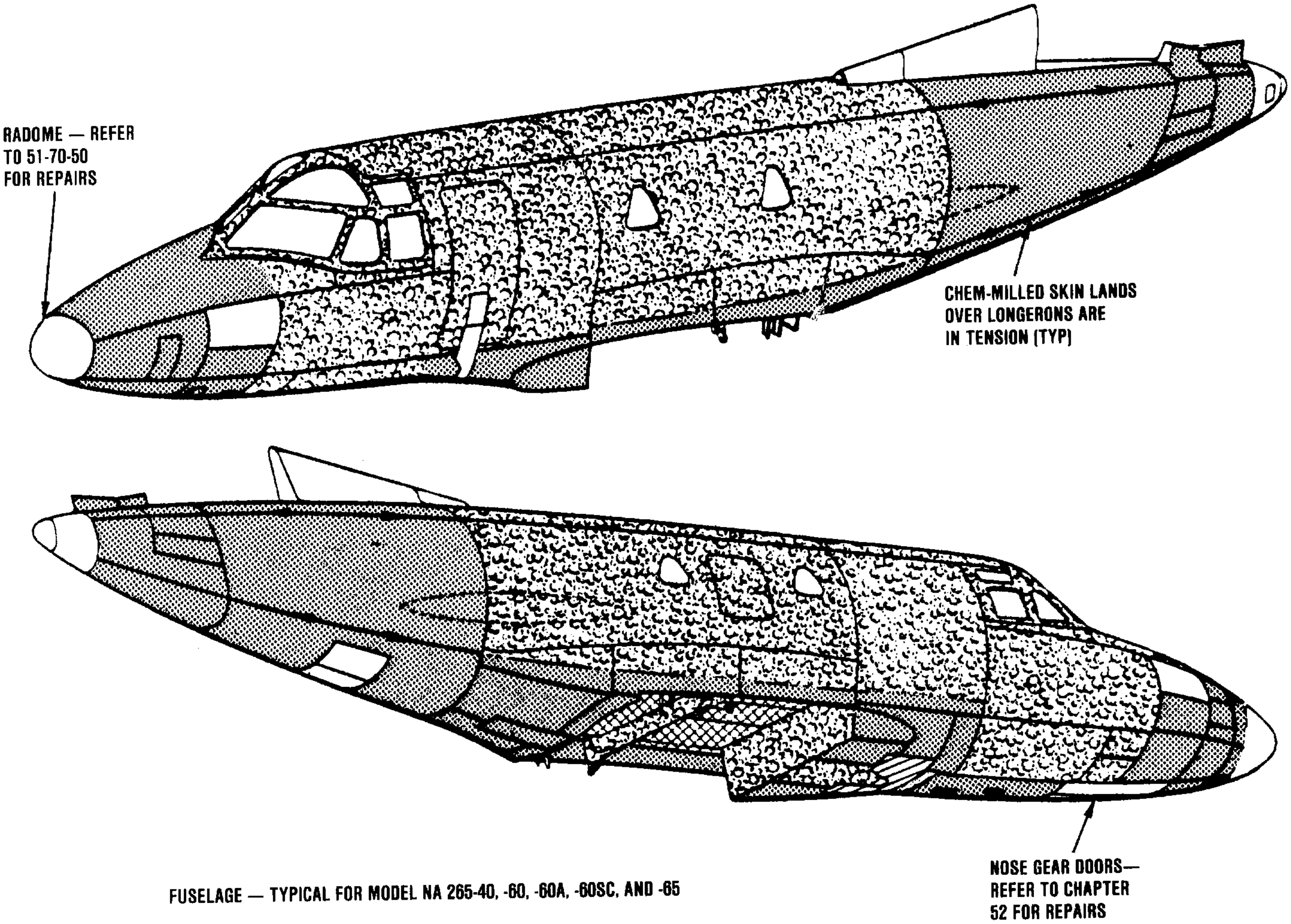
Typical Repair Index
Figure 1 (Sheet 3 of 9)



NOTES

- REFER TO TAIL GROUP REPAIR INDEXES FOR MATERIALS AND MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50.

Typical Repair Index
Figure 1 (Sheet 4 of 9)



FUSELAGE — TYPICAL FOR MODEL NA 265-40, -60, -60A, -60SC, AND -65

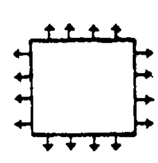
NOTES

- ***Use tension repairs on all bulkhead and beam webs that carry cabin pressure loads. Tension is distributed uniformly in member as shown.***
- ***Use shear repairs on all nonpressurized bulkhead and beam webs.***
- ***Refer to body group repair indexes for materials and material gauges. Measure thickness of chem-milled materials or refer to applicable drawings for thickness variations.***
- ***Refer to design mechanical properties tables for material allowables.***
- ***For negligible hole repair, refer to 51-70-50.***

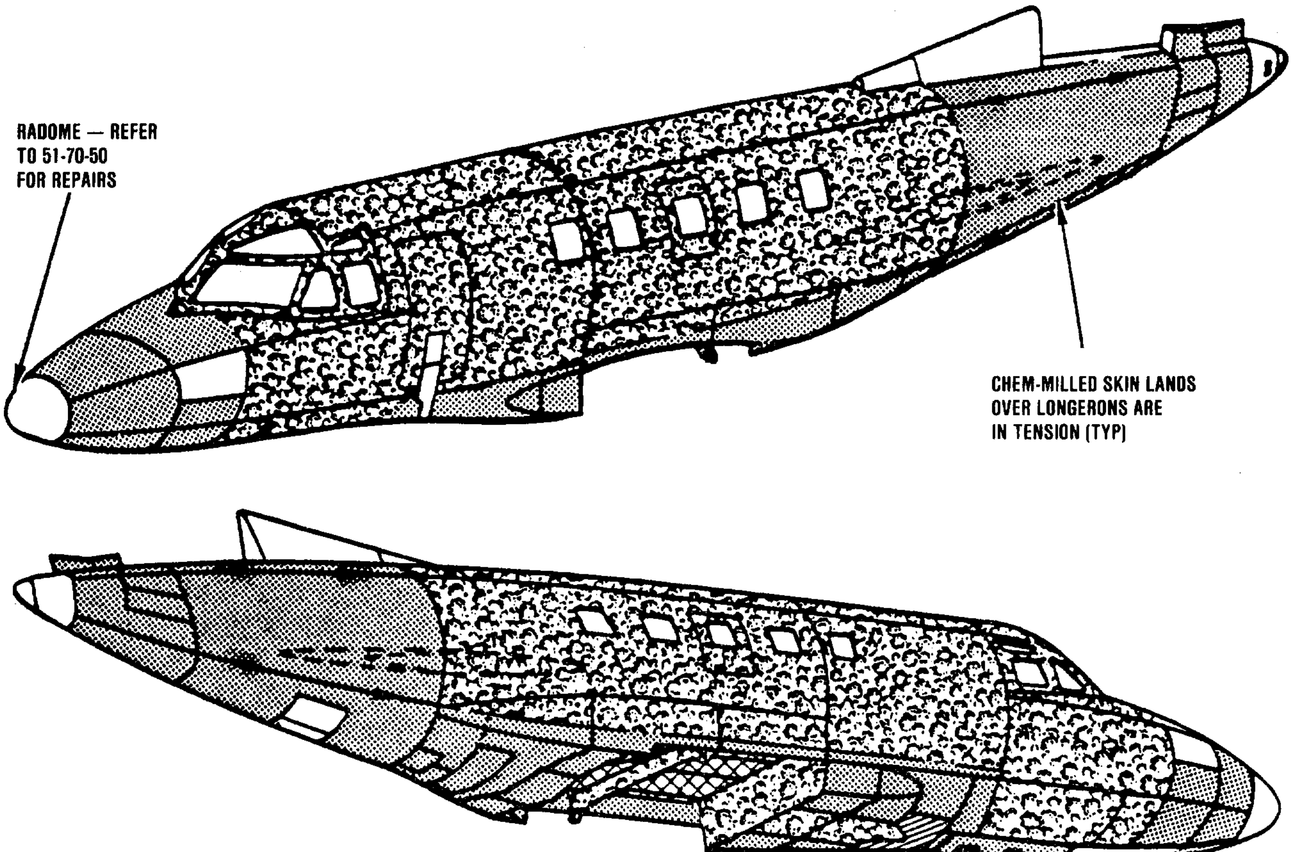
CODING APPLIES TO SKINS ONLY, EXCEPT AS NOTED

- PRIMARY STRUCTURE— USE TENSION-TYPE REPAIRS
- SECONDARY STRUCTURE— USE SECONDARY STRUCTURE REPAIRS, EXCEPT AS NOTED
- PRIMARY STRUCTURE— SPECIAL CONDITIONS DO NOT PERMIT USE OF TYPICAL REPAIRS
- PRIMARY STRUCTURE— SPECIAL CONDITIONS DO NOT PERMIT USE OF TYPICAL REPAIRS
- PRIMARY STRUCTURE — USE HONEYCOMB REPAIRS (REFER TO CHAPTER 53)

PRESSURIZED BULKHEAD AND BEAM WEB TENSION DIAGRAM



Typical Repair Index
(Figure 1 (Sheet 5 of 9)

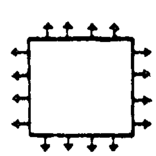


FUSELAGE — TYPICAL FOR MODEL NA 265-70, -80, -80A, AND -80SC

NOTES

- *Use tension repairs on all bulkhead and beam webs that carry cabin pressure loads. Tension is distributed uniformly in member as shown.*
- *Use shear repairs on all nonpressurized bulkhead and beam webs.*
- *Refer to body group repair indexes for materials and material gauges. Measure thickness of chem-milled materials or refer to applicable drawings for thickness variations.*
- *Refer to design mechanical properties tables for material allowables.*
- *For negligible hole repair, refer to 51-70-50.*

PRESSURIZED BULKHEAD AND BEAM WEB TENSION DIAGRAM

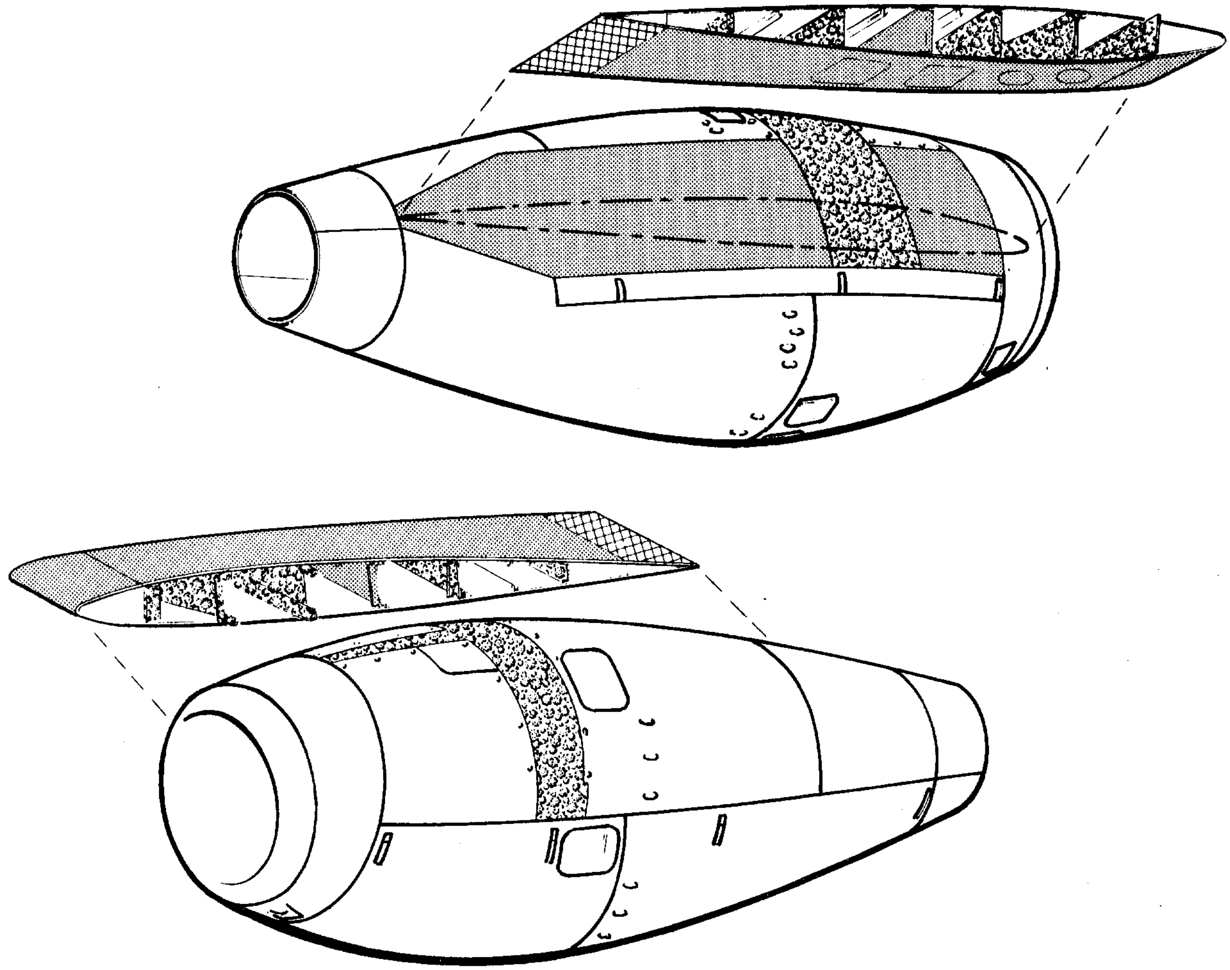


CODING APPLIES TO SKINS ONLY, EXCEPT AS NOTED

- PRIMARY STRUCTURE — USE TENSION-TYPE REPAIRS
- SECONDARY STRUCTURE — USE SECONDARY STRUCTURE REPAIRS, EXCEPT AS NOTED
- PRIMARY STRUCTURE — SPECIAL CONDITIONS DO NOT PERMIT USE OF TYPICAL REPAIRS
- PRIMARY STRUCTURE— SPECIAL CONDITIONS DO NOT PERMIT USE OF TYPICAL REPAIRS
- PRIMARY STRUCTURE — USE HONEYCOMB REPAIRS (REFER TO CHAPTER 53)

Typical Repair Index
Figure 1 (Sheet 6 of 9)

S370-3-17



CODING APPLIES TO SKINS ONLY

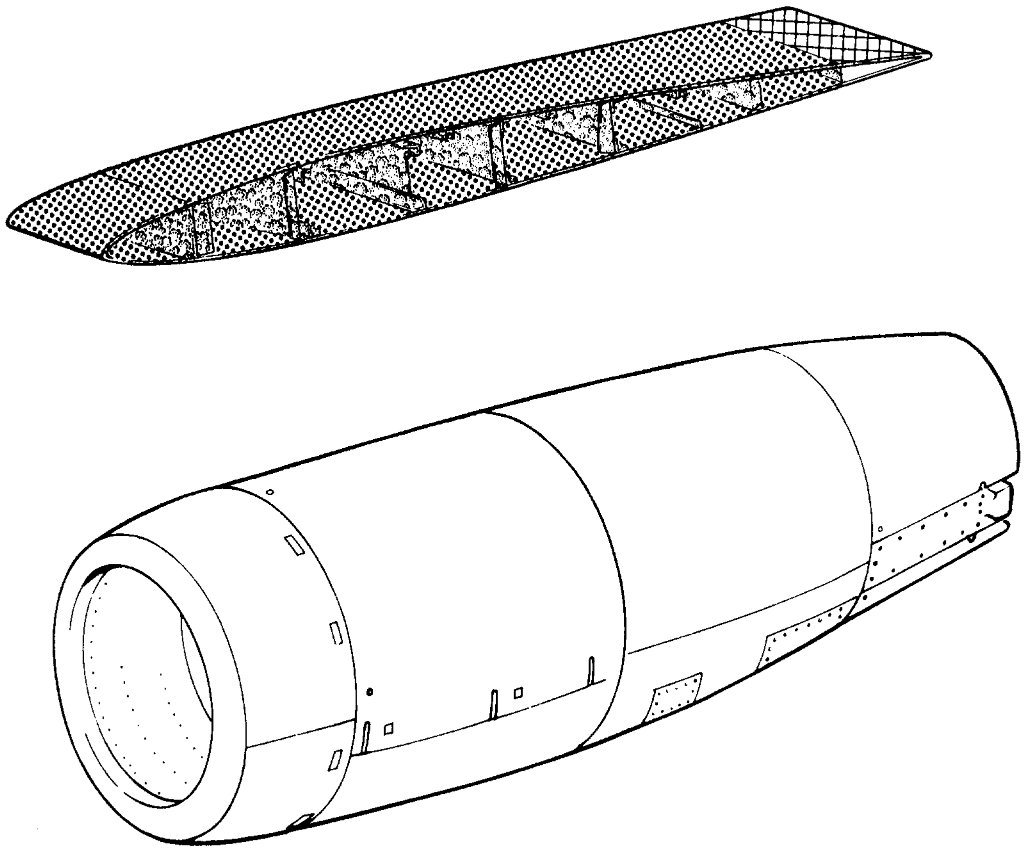
- PRIMARY STRUCTURE — USE SHEAR-TYPE REPAIRS
- SECONDARY STRUCTURE — REFER TO 50-70-10 FOR REPAIRS
- PRIMARY STRUCTURE — SPECIAL CONDITIONS DO NOT PERMIT USE OF TYPICAL REPAIRS
- PRIMARY STRUCTURE — USE HONEYCOMB TRAILING EDGE REPAIRS

NOTES

- REFER TO REPAIR INDEXES IN CHAPTER 54 FOR MATERIALS AND MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50.

MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8, AND -9)

Typical Repair Index
Figure 1 (Sheet 7 of 9)



CODING APPLIES TO SKINS ONLY

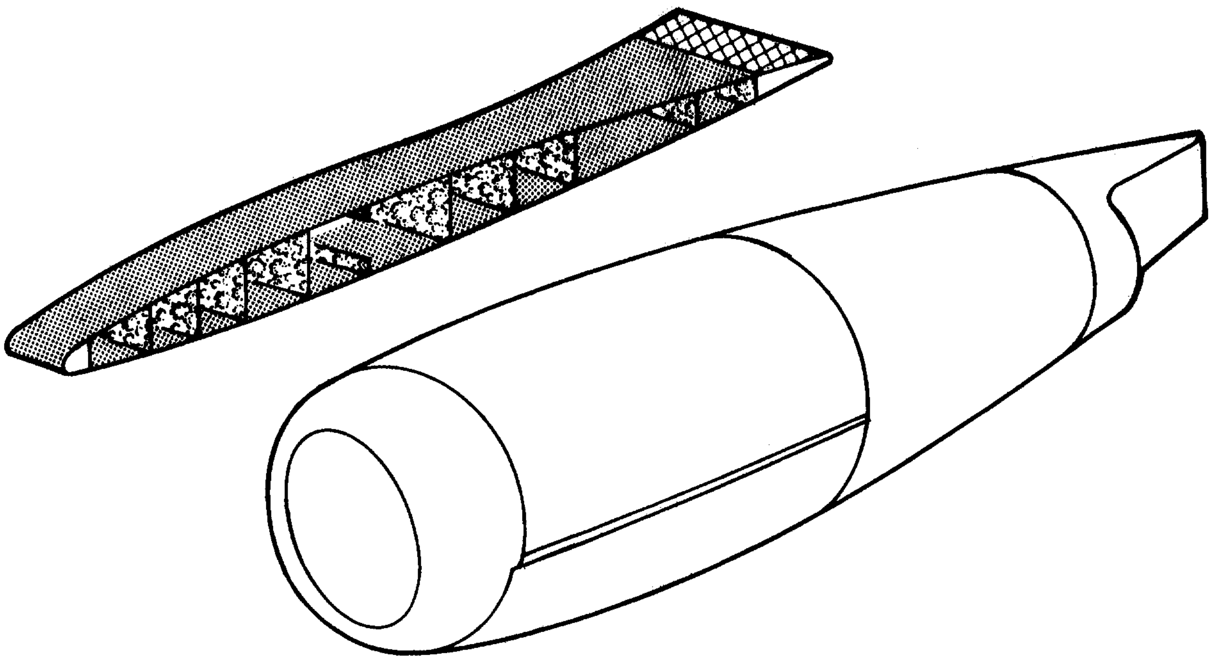
- [dotted pattern] PRIMARY STRUCTURE — USE SHEAR-TYPE REPAIRS
- [blank] SECONDARY STRUCTURE — REFER TO 50-70-10 FOR REPAIRS
- [stippled pattern] PRIMARY STRUCTURE — SPECIAL CONDITIONS DO NOT PERMIT USE OF TYPICAL REPAIRS
- [crosshatch pattern] PRIMARY STRUCTURE — USE HONEYCOMB TRAILING EDGE REPAIRS

NOTES

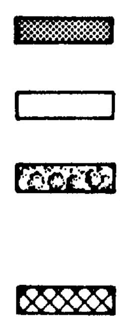
- REFER TO REPAIR INDEXES IN CHAPTER 54 FOR MATERIALS AND MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50.

MODEL NA 265-65

Typical Repair Index
Figure 1 (Sheet 8 of 9)



CODING APPLIES TO SKINS ONLY



NOTES

- REFER TO REPAIR INDEXES IN CHAPTER 54 FOR MATERIALS AND MATERIAL GAUGES. MEASURE THICKNESS OF CHEM-MILLED MATERIALS OR REFER TO APPLICABLE DRAWINGS FOR THICKNESS VARIATIONS.
- REFER TO DESIGN MECHANICAL PROPERTIES TABLES FOR MATERIAL ALLOWABLES.
- FOR NEGLIGIBLE HOLE REPAIR, REFER TO 51-70-50

MODEL NA 265-70 (S/N 370-1 AND -7), -80, -80A, AND -80SC

Typical Repair Index
Figure 1 (Sheet 9 of 9)

DEVELOPING TYPICAL REPAIRS

REPAIR

GENERAL

This portion of the section deals with repairing materials in respect to the manner in which they are being used in the airframe. The data presented is in keeping with the "safe-life" concept of structural design; that is, the ultimate strength of the material is restored and stress concentrations are not in excess of those in the original design of the part. In general, repairing the material means repairing it in respect to its primary loading; i.e., shear or tension. Primary loading is indicated in the typical repair index. (Refer to figure 1, 51-70-00.)

TYPICAL REPAIR INDEX

The typical repair index indicates those outer surface areas of the airframe that are considered primary structure and those that are considered secondary structure. For purposes here, all substructure must be considered as primary structure. In addition, the index indicates the primary (shear or tension) loads carried by the structure. Areas which, because of peculiarities of design or function, do not lend themselves to repair by general instructions are also shown.

DESIGN MECHANICAL PROPERTIES TABLES

Data relative to material design mechanical properties was extracted from Metallic Materials and Elements for Flight Vehicle Structures (MIL-HDBK-5) and is presented in simplified form. These tables provide the data necessary for calculating material loss and material that must be replaced due to damage.

SYMBOLS USED

The following is a list of the symbols (with explanations) used in typical repair development examples and accompanying tables.

SYMBOL	EXPLANATION
A	Area of cross section in square inches
D	Diameter
e	The minimum distance from a hole centerline to the edge of the sheet
F	Allowable stress
F_{bru}	Ultimate bearing stress
F_{bry}	Bearing yield stress
F_{cy}	Compressive yield stress
F_{su}	Ultimate shear stress
F_{tu}	Ultimate tensile stress
ksi	Kips (1000 pounds) per square inch
r	Radius
S	Fastener spacing
t	Thickness

STEPS IN DEVELOPING TYPICAL REPAIR

1. Items to Consider

   The following general instructions are based on repair of constant-thickness materials. Necessary variations for repair of chem-milled materials are covered in detailed repair examples.

   A. Loading
   Determine if member to be repaired is a primary or secondary structure. If member is a primary structure, determine if principle loading is shear or tension. To determine type of load, refer to typical repair index. (Refer to figure 1, 51-70-00).

   B. Material
   Determine material from which damaged member is made by consulting repair index for applicable component. (Refer to Chapters 27, and 51 through 57.)

   It is mandatory that repair be at least equal in strength to original part. Material selected for repair should be of same alloy where possible. Material availability and fabrication problems are factors that may dictate use of a substitute material. For selection of a substitute material, refer to paragraph 4, "Selecting Repair Material."

   C. Fasteners
   Select repair fasteners from strength of joints tables. (See tables 206 thru 229, 51-70-30.) Replace all removed fasteners with a like fastener that will produce a joint equal to, or stronger than, the original joint.

2. Use of Tables

   A. Material Design Mechanical Properties Tables (See tables 201 thru 205, 51-70-30.)

   Design mechanical properties tables give values in pounds per square in. of material for (1) tension, expressed as F_{tu}; (2) compression, expressed as F_{cy}; (3) shear, expressed as F_{su}; and (4) bearing, expressed as either F_{bru} or F_{bry}. Some values shown are "yield" (y) stresses and remainder are "ultimate" (u) stresses. Developing repairs from data given in this section does not require decisions as to selection of ultimate or yield values so terms are not explained.

REPAIR (Continued)

2. **Use of Tables (Cont'd)**

B. Making Calculations From Design Mechanical Properties Tables

Design mechanical properties tables give values in pounds per square inch. The first step in determining the requirements of a repair is to find cross-sectional area in square in. of the material to be replaced. Figure 201 shows method for calculating areas to be replaced in a rectangular cutout in sheet metal.

Referring to "Calculating Material Loss" in figure 201 and assigning 4 in. as value of l, 2 in. as value of l_1, and 0.040 as value of t, calculations are

$$A \text{ (area)} = 4 \times 0.040\ (l \times t)$$

$$A = 0.160 \text{ sq in.}$$

$$A_1 \text{ (area)} = 2 \times 0.040\ (l_1 \times t)$$

$$A_1 = 0.080 \text{ sq in.}$$

Cross-sectional area of material loss is thus determined. Second step in the calculations is finding strength loss in lbs (tension, compression, or shear, as applicable). This is done by multiplying area by the appropriate lbs per square in. value from the applicable design mechanical properties table. Assuming a rectangular trimmed-out damage (figure 201) with dimensions given in previous paragraph and assigning a material of 2024-T3 bare material loaded in shear, shear strength loss (and strength that must be replaced) is found by multiplying l x t and l_1 x t by F_{su} value for the material. F_{su} value for 2024-T3 bare material is found in figure 205, 51-70-30, a portion of which is reproduced in figure 201.

F_{su} value of 0.040 2024-T3 bare material is 40,000 psi. Use following formula to find shear strength-in-pounds loss.

$$(l_1 \times t)\ F_{su} \text{ or}$$
$$(4 \times 0.040)\ 40{,}000 \text{ psi} = 0.160 \times 40{,}000 \text{ psi} = 6440 \text{ lbs}$$

These calculations indicate that material/fastener joint strength must equal 6440 lbs (minimum) on each "l," or 4-inch, sides of the cutout. (See figure 201, 51-70-20.)

$$(l_1 \times t)\ F_{su} \text{ or}$$
$$(2 \times 0.040)\ 40{,}000 \text{ psi} = 0.080 \times 40{,}000 \text{ psi} = 3220 \text{ lbs}$$

Calculations for "l_1," or 2 in., sides indicate that 3220 pounds (minimum) is required in material/fastener joint strength for each of those sides. (See "Repair Joint Strength Distribution," in figure 201.)

Shear calculations were used in foregoing example. Tension (F_{tu}), compression (F_{cy}), and bearing (F_{bru} or F_{bry}) calculations are performed in exactly same way; i.e., cross-sectional area of material to be replaced is multiplied by value in table for property in question. Instructions for use of design mechanical properties tables for calculating material thickness requirements, as in material substitution, are given in paragraph 4, "Selecting Repair Material".

C. Strength of Joints Tables (See figures 206 thru 229, 51-70-30)

Strength of joints tables give pounds-per-fastener strength allowable for a given fastener in a specified material. In flush-head fastener installations, flushing operation (countersunk or dimple) affects joint strength, and installations are treated in separate tables. Ultimate strength values are given in all cases.

D. Making Calculations From Strength of Joint Tables

When material and joint strength have been determined and a fastener has been chosen, strength of joint table for that particular material/fastener combination is found. With an MS20426AD4 rivet selected for a countersunk installation in 2024-T3 bare material, find joint allowable in figure 206, 51-70-30, which is partially reproduced in sheet 1 of figure 201. (See "Example of Strength of Joint Tables.") Joint allowable found for this combination is 309 pounds per fastener. Number of fasteners required is found by dividing pounds-per-fastener value into material/fastener joint strength requirement, or

$$\frac{(l \times t)\ F_{su}}{\text{Fastener allowable}} = \text{number of fasteners required}$$

REPAIR (Continued)

2. **Use of Tables (Cont'd)**

E. Making Calculations From Strength of Joint Tables (Cont'd)

Assuming a repair problem with material, type of load, damage, and repair fastener as given in this paragraph and in paragraph 2B above, solving for number of fasteners required in repair is as follows:

$$\frac{(4 \times 0.040)\,40{,}000}{309} = \frac{6440}{309} = 20.8 \text{ or } 21 \text{ rivets}$$ [A]

$$\frac{(2 \times 0.040)\,40{,}000}{309} = \frac{3220}{309} = 10.4 \text{ or } 11 \text{ rivets}$$ [A]

3. Repair Fastener Distribution

Repair fastener distribution for skin and web repairs is shown in figure 201, 51-70-20.

4. Selecting Repair Material

A. It is generally advisable to select a repair material that matches material in damaged member. When to do so is impracticable or impossible, and a substitute material is to be used, requirements below must be observed.

B. In skin and web repairs, substitute repair material must be equal to, or stronger than, material to be repaired in shear and/or tension and in bearing. When, gauge-for-gauge, substitute material is weaker than material to be repaired, gauge must be increased. Amount of increase necessary to satisfy shear and tension requirements is found as follows:

$$\frac{F_{su} \text{ or } F_{tu} \text{ (damaged material)}}{F_{su} \text{ or } F_{tu} \text{ (repair material)}} = \text{increase in thickness reqd}$$

C. Determine bearing requirements from fastener allowable tables. When a gauge is found that satisfies shear and/or tension requirements, make a check to determine whether repair fasteners to be used will produce as strong a joint in repair material as they will in damaged material.

D. Using as an example a skin splice (figure 201) involving a 0.050 in. 7178-T6 bare damaged skin, splice material is 7075-T6 bare damaged skin, splice material is 7075-T6 bare material and fasteners are MS20426AD5 rivets. Installation is countersunk. Gauge required for repair material is found as follows:

7178-T6 bare material

F_{tu} = 83,000 lb per sq in.

7075-T6 bare material

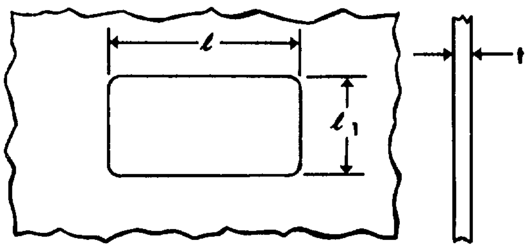
F_{tu} = 76,000 lb per sq in.

83,000 - 76,000 = 1.092 (increase in thickness reqd)

1.092 x 0.050 = 0.0546 (thickness reqd)

First standard gauge heavier than 0.0546 is 0.063 and is indicated as gauge to use at this point. Final check for fastener joint strength shows the MS20426AD5 rivets countersunk in 0.050 in. 7178-T6 bare material good for 479 lbs. Same fastener countersunk in 0.063 in. 7075-T6 bare material is good for 523 lbs. Relative fastener joint strengths show gauge of repair material found in tension calculations to be adequate as a splice member. To check suitability of this gauge as a splice doubler, protruding-head fastener allowable must be referred to. An MS20470AD5 rivet is identical to the MS20426 rivet in material and hardness, and joint formed with it in repair material is joint to be checked in this instance. Check reveals MS20470AD5 rivet good for 594 lbs in 0.063 in. 7075-T6 bare material. Findings show this material and gauge to be adequate as a splice doubler.

[A] Use additional fastener when decimal is 0.15 or greater.



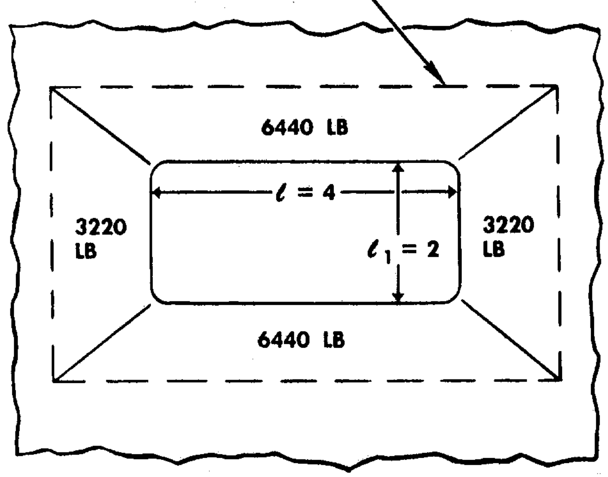
AREA OF SIDE "l" = "l" x t
AREA OF SIDE l1 = l1 x t

AREAS OF UNLETTERED SIDES
EQUAL THE SIDE OPPOSITE

CALCULATING MATERIAL LOSS

	BARE	
CONDITION	−T3	
THICKNESS (IN.)	0.010 TO 0.249	
MECHANICAL PROPERTIES		
F_{tu} (ksi)	63	
F_{cy} (ksi)	40	
F_{su} (ksi)	(40)	
F_{bru} (ksi)		
e/D = 1.5	98	
e/D = 2.0	118	

EXAMPLE OF DESIGN MECHANICAL PROPERTIES TABLE



REPAIR JOINT STRENGTH DISTRIBUTION

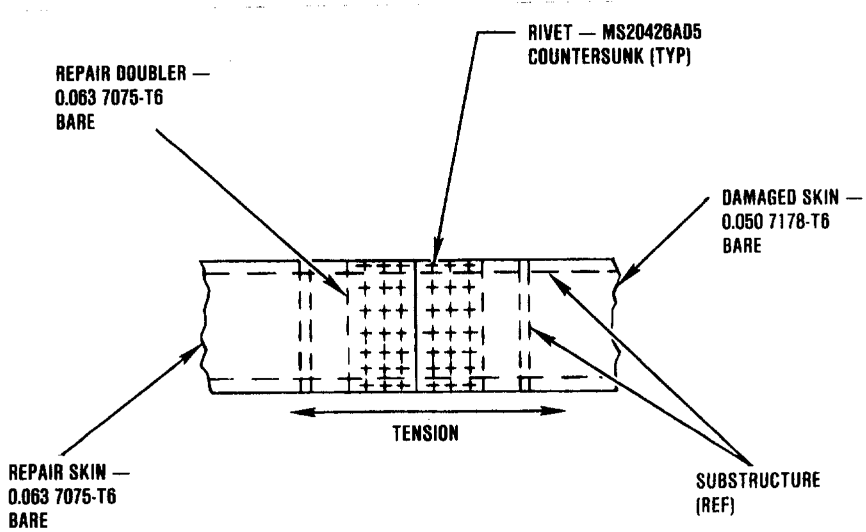
S265-3-77

Developing a Typical Repair
Figure 201 (Sheet 1 of 2)

COUNTERSUNK — 2024-T42 CLAD A

ULTIMATE STRENGTH IN POUNDS		
RIVET	MS20426AD	
RIVET (IN.)	3/32	1/8
SHEET THICKNESS (IN.)		
0.020	132	163
0.025	156	221
0.032	178	272
0.040	193	309
0.050	206	340

EXAMPLE OF STRENGTH OF JOINT TABLES



SKIN SPLICE

NOTE

A USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

S265-3-78

Developing a Typical Repair
Figure 201 (Sheet 2 of 2)

REPAIR CALCULATIONS AND GENERAL REPAIR REQUIREMENTS

REPAIR

BASIC FASTENER CALCULATIONS

Figure 201 deals with the least complex of repairs and explains basic formulas used in computing requirements of repair. Only problems involved in repairing damage to constant-thickness materials between ribs or frames are treated. These problems are common to all repairs presented, and subsequent repair examples deal only with problems involved in specific condition. Figure 201 is referenced for fundamental information necessary for calculating requirements of all special condition repairs.

GENERAL REPAIR CALCULATIONS

Figure 202 deals with selection of repair doubler materials and gauges, fastener spacing, trim radii and related data. Figure 202 is referenced on each repair example, and data contained in this illustration is applicable whenever specific instructions are not given in example.

SYMBOLS AND TERMS USED IN THIS ILLUSTRATION

D Diameter
F_{su} Ultimate shear stress of material (from design mechanical properties tables)
F_{tu} Ultimate tensile stress of material (from design mechanical properties tables)
ℓ Length of cut
ℓ_1 Length of cut (on a second side)
t Thickness

JOINT ALLOWABLE — STRENGTH OF FASTENER AND INSTALLATION (SELECTED) IN MATERIAL TO BE REPAIRED (FROM STRENGTH OF JOINTS TABLES)

BASIC TENSION REPAIR CALCULATIONS

$\frac{(\ell \times t)\, F_{su}}{\text{Joint allowable}} =$ No. of fasteners required on each shear side (See sketches 1 and 3.)

$\frac{(\ell_1 \times t)\, F_{tu}}{\text{Joint allowable}} =$ No. of fasteners required on each tension side (See sketches 1 and 3.)

ASSUMING MATERIAL AND TRIMMED-OUT DAMAGE TO BE AS GIVEN IN SKETCH 2 AND REPAIR TO BE MADE WITH MS20426 AD5 RIVETS, DIMPLED, NUMBER OF FASTENERS REQUIRED WOULD BE FOUND AS FOLLOWS:

SHEAR SIDES—

$$\frac{(4 \times 0.040)\ \ 38{,}000}{635} = \frac{0.160 \times 38{,}000}{635} =$$

6080 ÷ 635 = 9.57 or 10 rivets **A**

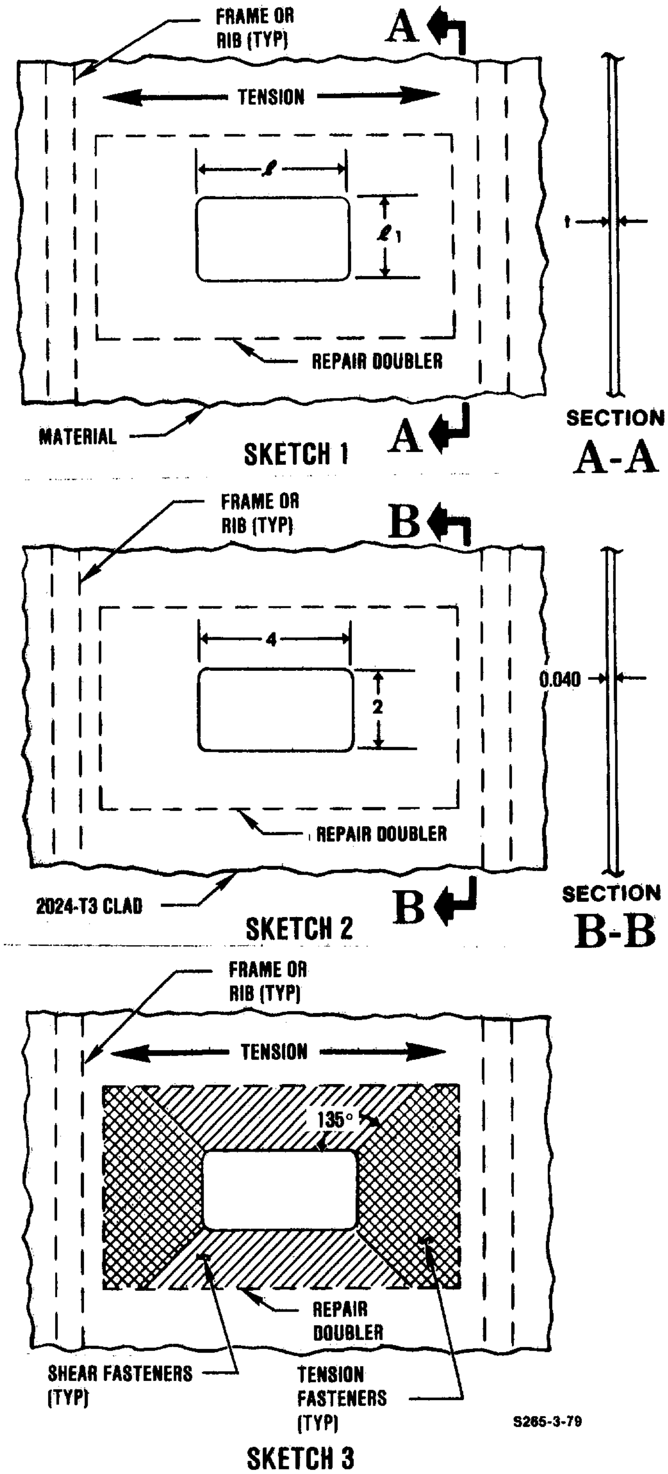
TENSION SIDES—

$$\frac{(2 \times 0.040)\ \ 58{,}000}{635} = \frac{0.080 \times 58{,}000}{635} =$$

4640 ÷ 635 = 7.3 or 8 rivets

NOTES

- THIS ILLUSTRATION PROVIDES BASIC INSTRUCTIONS FOR CALCULATING AND DISTRIBUTING FASTENERS REQUIRED FOR SKIN AND WEB REPAIRS.
- ONLY REPAIRS INVOLVING CONSTANT THICKNESS MATERIALS WITHIN SUBSTRUCTURE BAYS, ARE COVERED HERE. INSTRUCTIONS FOR VARYING THESE CALCULATIONS TO PROVIDE FOR REPAIR OF CHEM-MILLED MATERIALS AND DAMAGE ACROSS SUBSTRUCTURE ARE GIVEN SEPARATELY.
- A TENSION REPAIR WITH RECTANGULAR CUTOUT (SKETCHES 1, 2, AND 3) IS USED AS PRINCIPAL EXAMPLE IN EXPLAINING CALCULATION PROCEDURES AS BOTH TENSION AND SHEAR PROBLEMS ARE INVOLVED — TENSION IN DIRECTION OF PRIMARY LOAD AND SHEAR ON ADJACENT SIDES.
- DETERMINATION AS TO WHETHER A SHEAR- OR A TENSION-TYPE REPAIR IS REQUIRED IS MADE BY REFERRING TO "TYPICAL REPAIR INDEX."
- REFER TO "GENERAL REPAIR REQUIREMENTS" FOR FASTENER SPACING, REPAIR DOUBLER REQUIREMENTS, TRIM RADII, AND RELATED DATA.



NOTE

REQUIRED FASTENERS ARE DISTRIBUTED AS SHOWN IN SKETCH 3.

A USE ADDITIONAL FASTENER WHEN DECIMAL IS 0.15 OR GREATER.

Basic Fastener Calculations and Constant-thickness Skin Repair
Figure 201 (Sheet 1 of 4)

TENSION REPAIR (SKETCH 4)

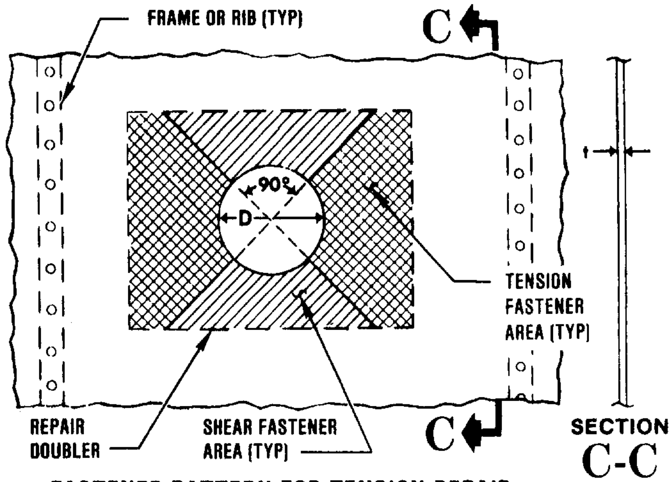
Fastener calculations for a tension repair with circular cutout are same as those given for a rectangular cutout (sketch 1) except that "D" is substituted for ℓ and ℓ_1

Formula for solution is:

$$\frac{(D \times t)\ F_{su}}{\text{Joint allowable}} = \text{No. of fasteners required on each shear side of repair}$$

$$\frac{(D \times t)\ F_{tu}}{\text{Joint allowable}} = \text{No. of fasteners required on each tension side of repair}$$

Distribute fasteners as shown in sketch.



FASTENER PATTERN FOR TENSION REPAIR BETWEEN FRAMES OR RIBS — CIRCULAR CUTOUT
SKETCH 4

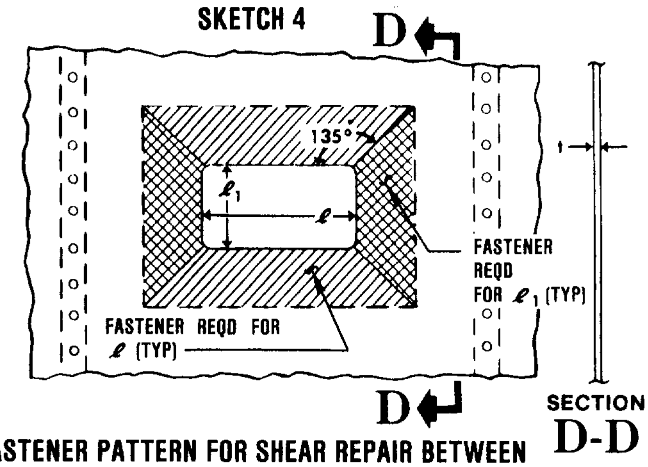
SHEAR REPAIR (SKETCH 5)

Calculate fastener requirements for shear repairs (rectangular cutout) as follows:

$$\frac{(\ell \times t)\ F_{su}}{\text{Joint allowable}} = \text{No. of fasteners required each side of "}\ell\text{"}$$

$$\frac{(\ell_1 \times t)\ F_{su}}{\text{Joint allowable}} = \text{No. of fasteners required each side of "}\ell_1\text{"}$$

Distribute fasteners as shown in sketch.



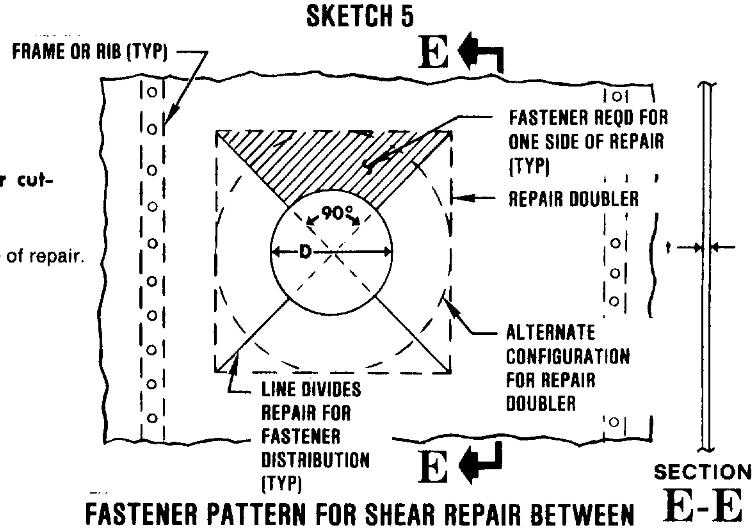
FASTENER PATTERN FOR SHEAR REPAIR BETWEEN FRAMES OR RIBS — RECTANGULAR CUTOUT
SKETCH 5

SHEAR REPAIR (SKETCH 6)

Calculate fastener requirements for shear repairs (circular cutout) as follows:

$$\frac{(D \times t)\ F_{su}}{\text{Joint allowable}} = \text{No. of fasteners required on each (4) side of repair.}$$

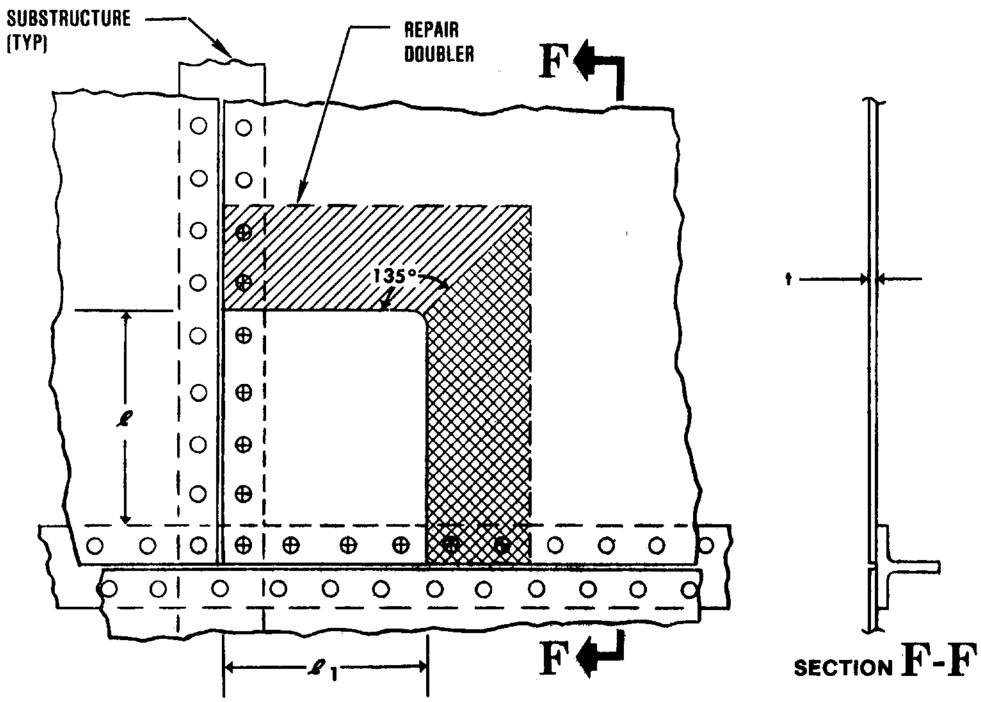
Distribute fasteners as shown in sketch.



FASTENER PATTERN FOR SHEAR REPAIR BETWEEN FRAMES OR RIBS — CIRCULAR CUTOUT
SKETCH 6

S265-3-80

Basic Fastener Calculations and Constant-thickness Skin Repair
Figure 201 (Sheet 2 of 4)

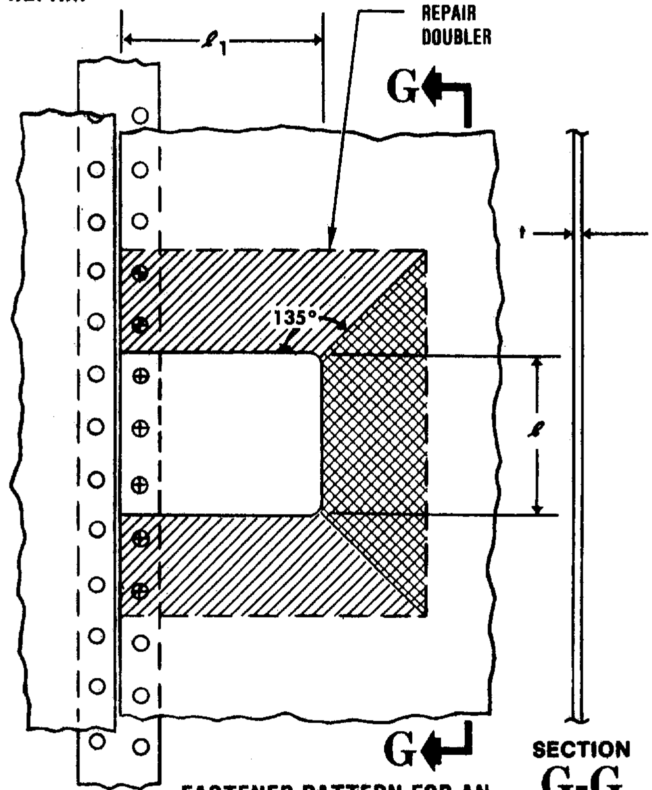


FASTENER PATTERN FOR A CORNER REPAIR — SHEAR OR TENSION
SKETCH 7

VARIATIONS OF RECTANGULAR REPAIR — SHEAR OR TENSION (SKETCHES 7 AND 8)

Calculations for finding fastener requirements for corner or edge repairs are same as for other rectangular repairs. Replacement fasteners in substructure must be equal to, or stronger than, those removed.

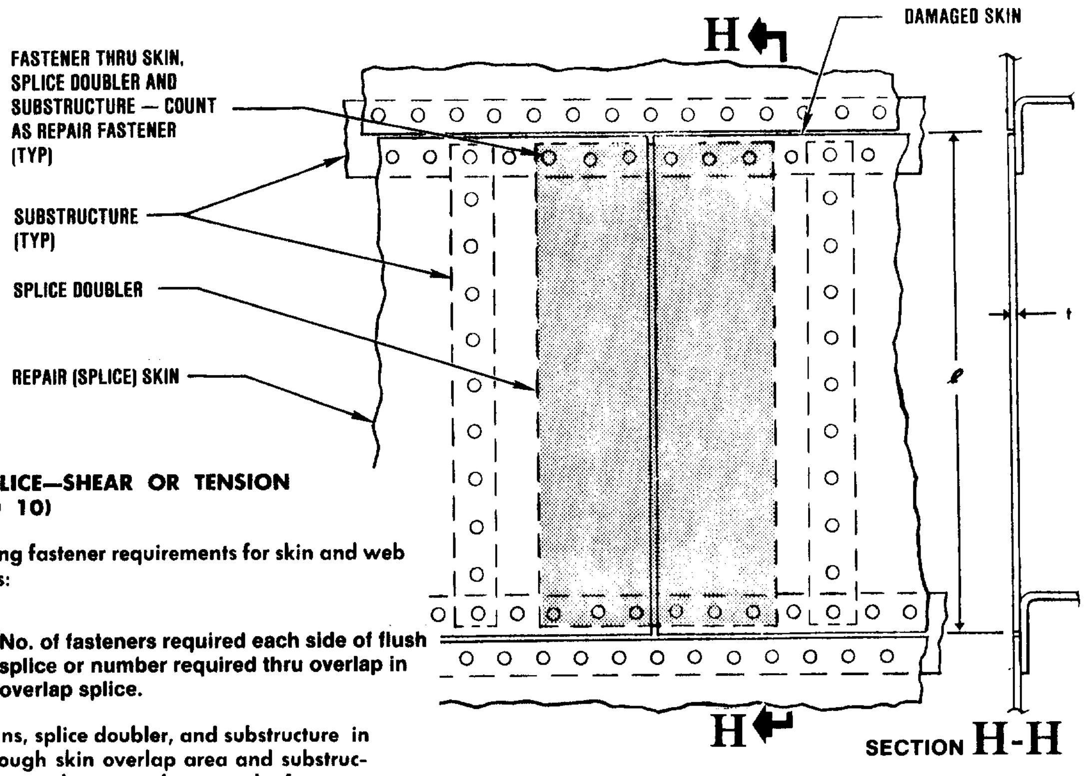
Distribute fasteners as shown in referenced sketches.



FASTENER PATTERN FOR AN EDGE REPAIR — SHEAR OR TENSION
SKETCH 8

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Basic Fastener Calculations and Constant-thickness Skin Repair
Figure 201 (Sheet 3 of 4)



FLUSH SKIN OR WEB SPLICE — SHEAR OR TENSION
SKETCH 9

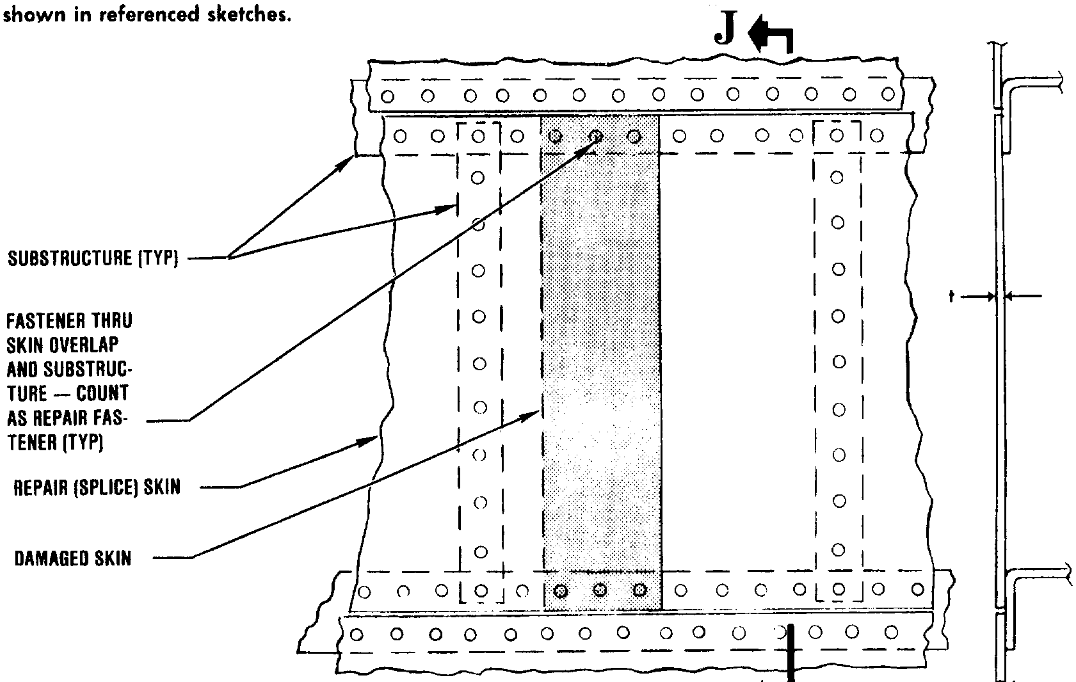
SKIN OR WEB SPLICE—SHEAR OR TENSION (SKETCHES 9 AND 10)

Calculations for finding fastener requirements for skin and web splices are as follows:

$$\frac{(\ell \times t)F_{su} \text{ or } F_{tu}}{\text{Joint allowable}}$$ = No. of fasteners required each side of flush splice or number required thru overlap in overlap splice.

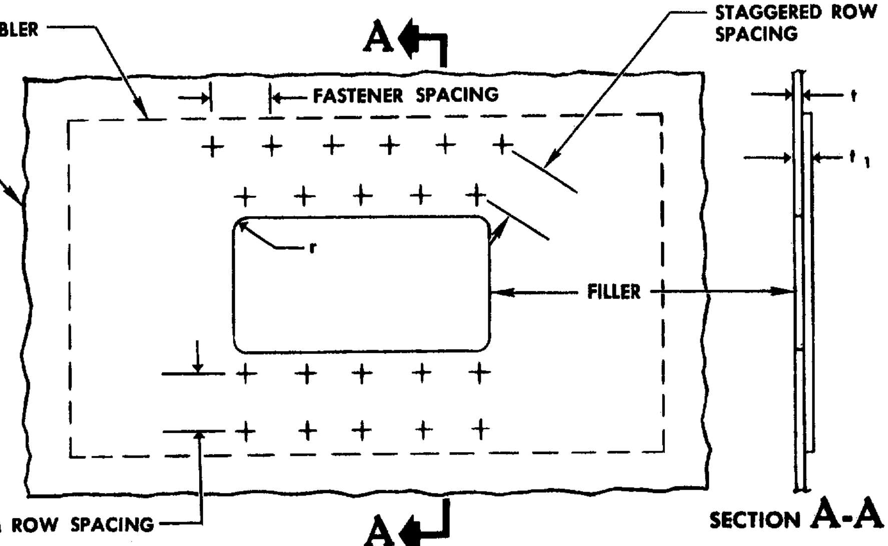
Fasteners through skins, splice doubler, and substructure in flush repair, and through skin overlap area and substructure in overlap splice, may be counted among the fasteners required for splice.

Distribute fasteners as shown in referenced sketches.



OVERLAP SKIN OR WEB SPLICE —SHEAR OR TENSION
SKETCH 10

Basic Fastener Calculations and Constant-thickness Skin Repair
Figure 201 (Sheet 4 of 4)



SKETCH 1

SYMBOLS USED IN THIS ILLUSTRATION

D—Diameter (of fastener)
e—Minimum distance from hole centerline to edge of sheet
r—Radius
t—Material thickness
t_1—Repair doubler thickness

FASTENER SPACING—Spacing for fasteners carrying tension loads (skin) shall not be less than spacing of nearest adjacent existing row. Minimum spacing for fasteners carrying shear loads (skin) is 5.5D. Maximum spacing for all fasteners is 1.5 inches.

FASTENER ROW SPACING—Fastener row spacing (uniform and staggered) is determined by minimum and maximum fastener spacing.

e=2D, with following exception:
Protruding head fasteners may be installed at 1.5D, when necessary, by reducing joint allowable (which is based on 2D) in direct proportion to ultimate bearing stress (F_{bru}) of the material. (See example with sketch 2.)

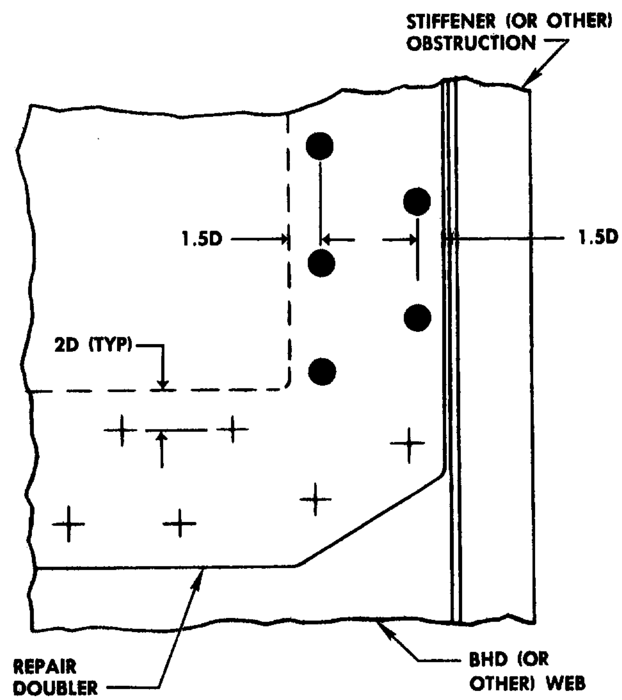
REPAIR DOUBLER—Generally, repair doubler should be of same alloy and heat treat as material being repaired with t_1 one gauge heavier than t. (Refer to "Old Standard" from "Standard Sheet Metal Thicknesses.") When doubler material differs from material being repaired (as when CRES is used for minimum thickness), it must meet following conditions:
(1) In tension — F_{tu} (doubler) × t (doubler) × width (doubler) = F_{tu} (skin) × t (skin) × ℓ (skin). (2) In shear — F_{su} (doubler) × t (doubler) × width (doubler) = F_{su} (skin) × t (skin) × ℓ (skin). (3) Joint allowable (for the selected fastener in doubler material) must be equal to, or greater than, allowable for material being repaired.

FILLER—A nonstructural filler may be of any material within alloy family of surrounding material. Filler thickness is equal to t. Filler may be attached to repair doubler with any structural fastener, spaced at not more than 1.5 inches.

COUNTERSINKING — See sheet 2.

CALCULATING JOINT ALLOWABLE FOR e/D = 1.5 FASTENER
(See sketch 2.)

$$\frac{F_{bru},\ e/D = 1.5}{F_{bru},\ e/D = 2.0} \times \text{Fastener allowable, } e/D = 2.0 = \text{Fastener allowable, } e/D = 1.5$$



SKETCH 2

● Fasteners affected by short (1.5) edge distance.

Example: Substituting the allowables for MS20470AD5 rivet in 0.050 7075-T6 bare al aly sheet

$$\frac{116{,}000 \text{ psi}}{146{,}000 \text{ psi}} \times 594 \text{ lb} = 470 \text{ lb}$$

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General Repair Requirements
Figure 202 (Sheet 1 of 2)

CONVENTIONAL RIVETS

RIVET DIA	MIN THICKNESS FOR COUNTERSINK (ON ASSY)	MIN THICKNESS FOR SUBCOUNTERSINK	COUNTERSINK DIA	SUBCOUNTERSINK DIA
3/32	A	0.040	0.179	0.184
1/8	A	0.050	0.225	0.235
5/32	A	0.063	0.286	0.296
3/16	A	0.080	0.353	0.367
1/4	A	0.100	0.476	0.498

NAS1097 AND HS47 HI-SHEAR RIVETS (AS APPLICABLE)

RIVET DIA	MIN THICKNESS FOR COUNTERSINK (ON ASSY)	MIN THICKNESS FOR SUBCOUNTERSINK	COUNTERSINK DIA	SUBCOUNTERSINK DIA
1/8	A	0.040	0.179	0.184
5/32	A	0.050	0.225	0.235
3/16	A	0.063	0.299	0.300
1/4	A	0.072	0.392	0.390
5/16	A	0.080	0.471	0.477

SCREWS

SCREW SIZE	MIN THICKNESS FOR COUNTERSINK (ON ASSY)	MIN THICKNESS FOR SUBCOUNTERSINK B	COUNTERSINK DIA B	SUBCOUNTERSINK DIA B
No. 10	A	0.090	0.378	0.395
1/4	A	0.125	0.499	0.520
5/16	A	0.160	0.626	0.645

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NOTES

- DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED.

A USE MINIMUM THICKNESS FROM APPLICABLE STRENGTH OF JOINTS TABLE.

B FOR 7S39 SCREW, USE DIMENSIONS GIVEN FOR HI-SHEAR RIVETS.

General Repair Requirements
Figure 202 (Sheet 2 of 2)

MATERIAL DESIGN MECHANICAL PROPERTIES AND STRENGTH OF JOINTS TABLES

REPAIR

GENERAL

Material design mechanical properties tables and strength of joint tables are presented in tables 201 thru 229. Table titles are listed below.

MATERIAL DESIGN MECHANICAL PROPERTIES

STRENGTH OF JOINTS

Table 201. Design Mechanical Properties Of 2024 Aluminum Alloy

BARE			
CONDITION	−T3	−T4	−T42
THICKNESS (IN.)	0.010 TO 0.249	0.250 TO 0.500	UNDER 0.250
MECHANICAL PROPERTIES			
F_{tu} (ksi)	63	60	60
F_{cy} (ksi)	40	38	40
F_{su} (ksi)	40	40	37
F_{bru} (ksi)			
e/D = 1.5	98	96	84
e/D = 2.0	118	111	96
F_{bry} (ksi)			
e/D = 1.5	69	64	56
e/D = 2.0	79	74	64

CLAD					
CONDITION	−T3		−T4	−T42	
THICKNESS (IN.)	0.010 TO 0.063	0.064 TO 0.249	0.250 TO 0.499	0.008 TO 0.062	0.063 TO 0.249
MECHANICAL PROPERTIES					
F_{tu} (ksi)	58	60	60	51	54
F_{cy} (ksi)	37	38	38	34	36
F_{su} (ksi)	38	40	40	34	35
F_{bru} (ksi)					
e/D = 1.5	90	95	95	72	75
e/D = 2.0	109	111	111	81	87
F_{bry} (ksi)					
e/D = 1.5	64	64	64	48	50
e/D = 2.0	73	74	74	54	58

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Table 202. Design Mechanical Properties of 7075 Aluminum Alloy

	BARE			CLAD		
THICKNESS (IN.)	0.015 TO 0.039	0.040 TO 0.249	0.250 TO 0.500	0.015 TO 0.039	0.040 TO 0.062	0.063 TO 0.187
MECHANICAL PROPERTIES						
F_{tu} (ksi)	76	77	77	70	72	73
F_{cy} (ksi)	67	68	69	62	64	65
F_{su} (ksi)	46	46	46	42	43	44
F_{bru} (ksi)						
e/D = 1.5	114	116	108	105	108	110
e/D = 2.0	144	146	139	133	137	139
F_{bry} (ksi)						
e/D = 1.5	92	94	87	85	88	90
e/D = 2.0	106	107	100	98	101	102

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Table 203. Design Mechanical Properties Of 7178 Aluminum Alloy

	BARE			CLAD		
THICKNESS (IN.)	0.015 TO 0.044	0.045 TO 0.249	0.250 TO 0.499	0.015 TO 0.044	0.045 TO 0.249	0.250 TO 0.499
MECHANICAL PROPERTIES						
F_{tu} (ksi)	83	84	84	76	78	78
F_{cy} (ksi)	73	74	74	67	69	69
F_{su} (ksi)	50	50	50	45	47	47
F_{bru} (ksi)						
e/D = 1.5	124	126	118	114	117	109
e/D = 2.0	158	160	151	144	148	140
F_{bry} (ksi)						
e/D = 1.5	102	104	96	94	96	90
e/D = 2.0	117	118	111	107	110	104

S265-3-87

Table 204. Design Mechanical Properties of Alloy Steels

ALLOY	4130, 4140, 4340, 8630, 8740, 81B30, AND 98BV40						
FORM	ALL WROUGHT FORMS						
CONDITION	N [A]	N [B]	HEAT-TREATED (QUENCHED AND TEMPERED) TO OBTAIN THE F_{tu} INDICATED				
THICKNESS (IN.)	0.188 AND GREATER	LESS THAN 0.188					
MECHANICAL PROPERTIES							
F_{tu} (ksi)	90	95	125	150	180	200	260 [B]
F_{cy} (ksi)	70	75	113	145	179	198	242
F_{su} (ksi)	55	55	82	95	109	119	149
F_{bru} (ksi)							
e/D = 1.5			194	219	250	272	347
e/D = 2.0	140	140	251	287	326	351	440
F_{bry} (ksi)							
e/D = 1.5			151	189	230	255	312
e/D = 2.0			180	218	256	280	346

S265-3-88

NOTES

[A] THIS VALUE IS APPLICABLE WHEN MATERIAL IS FURNISHED IN CONDITION N OF APPLICABLE MILITARY SPECIFICATION. YIELD STRENGTH IS APPRECIABLY REDUCED WHEN NORMALIZED BY USER.

[B] APPLICABLE TO 4340 AND 988V40 ONLY. ALLOY 4340 SHOULD NOT BE USED BETWEEN 220 AND 260 kis.

Table 205. Design Mechanical Properties Of AISI 301 CRES Sheet and Strip

CONDITION	ANNEALED	COLD ROLLED			
		1/4 H	1/2 H	3/4 H	FULL H
THICKNESS (IN.)	TO 0.188	TO 0.188	TO 0.188	TO 0.188	TO 0.188
MECHANICAL PROPERTIES					
F_{tu} (ksi)	45	112	150	175	185
F_{cy} (ksi)	35	43	58	76	85
F_{su} (ksi)	40	67	80	95	100
F_{bru} (ksi) e/D = 2.0	75	210	300	350	370
F_{bry} (ksi) e/D = 2.0	50	140	200	240	270

S265-3-90

Table 206. Strength of Joints — MS20426 Rivets in 2024-T42 Clad (and Higher Strength) Aluminum Alloy Sheet

DIMPLED — 2024-T42 CLAD [A]						
ULTIMATE STRENGTH IN POUNDS						
RIVET	MS20426AD				MS20426DD	
RIVET DIA (IN.)	3/32	1/8	5/32	3/16	3/16	1/14
SHEET THICKNESS (IN.)						
0.016	177					
0.020	209	299				
0.025	235	360	474			
0.032	257	413	568	722	744	
0.040	273	451	635	839	941	879
0.050		484	693	940	1110	1359
0.063			736	1012	1236	1727
0.071			755	1045	1291	1883
0.081				1074	1340	2025
0.090				1098	1382	2150
0.100						2255

S265-3-91

NOTES

- ALLOWABLES APPLY TO DOUBLE DIMPLED SHEETS AND TO UPPER SHEET DIMPLED INTO A MACHINE-COUNTERSUNK LOWER SHEET. SHEET GAUGE IS THAT OF THINNEST SHEET FOR DOUBLE DIMPLED JOINTS AND OF UPPER DIMPLE SHEET FOR DIMPLED, MACHINE-COUNTERSUNK JOINTS. THICKNESS OF MACHINE-COUNTERSUNK SHEET MUST BE AT LEAST ONE TABULATED GAUGE THICKER THAN UPPER SHEET.

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 206. Strength of Joints — MS20426 Rivets in 2024-T42 Clad (and Higher Strength) Aluminum Alloy Sheet (Cont'd)

COUNTERSUNK — 2024-T42 CLAD [A]						
ULTIMATE STRENGTH IN POUNDS						
RIVET	MS20426AD				MS20426DD	
RIVET (IN.)	3/32	1/8	5/32	3/16	3/16	1/4
SHEET THICKNESS (IN.)						
0.020	132	163				
0.025	156	221	165			
0.032	178	272	300		306	
0.040	193	309	397	409	543	
0.050	206	340	481	583	758	891
0.063	216	363	523	705	886	1216
0.071		373	542	739	942	1353
0.080			560	769	992	1473
0.090			575	795	1035	1579
0.100				818	1073	1672
0.125				853	1131	1877
0.160						2000
0.190						2084
Shear	217	388	596	862	1180	2120

S265-3-91

NOTES

- SHEET GAUGE IS THAT OF COUNTERSUNK SHEET. IN CASES WHERE LOWER SHEET IS THINNER THAN UPPER, SHEAR-BEARING ALLOWABLE FOR LOWER SHEET-RIVET COMBINATION SHOULD BE COMPUTED.

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 207. Strength of Joints — MS20426 Rivets in 7075-T6 Clad (and Higher Strength) Aluminum Alloy Sheet

DIMPLED — 7075-T6 CLAD [A]					
ULTIMATE STRENGTH IN POUNDS					
RIVET	MS20426AD			MS20426DD	
RIVET DIA (IN.)	1/8	5/32	3/16	3/16	5/32
SHEET THICKNESS (IN.)					
0.020	302				
0.025	383	474			
0.032	454	568	725	786	
0.040	505	635	891	982	1300
0.050	548	693	1036	1152	1705
0.063		736	1142	1277	2010
0.071		755	1190	1332	2150
0.080			1230	1380	2260
0.090			1267	1424	2365
0.100					2455

S265-3-92

NOTES

- ALLOWABLES APPLY TO DOUBLE DIMPLED SHEETS AND TO UPPER SHEET DIMPLED INTO A MACHINE-COUNTERSUNK LOWER SHEET. SHEET GAUGE IS THAT OF THINNEST SHEET FOR DOUBLE DIMPLED JOINTS AND OF UPPER DIMPLE SHEET FOR DIMPLED, MACHINE-COUNTERSUNK JOINTS. THICKNESS OF MACHINE-COUNTERSUNK SHEET MUST BE AT LEAST ONE TABULATED GAUGE THICKER THAN UPPER SHEET.

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 207. Strength of Joints — MS20426 Rivets in 7075-TG Clad (and Higher Strength) Aluminum Alloy Sheet (Cont'd)

COUNTERSUNK — 7075-T6 CLAD [A]						
ULTIMATE STRENGTH IN POUNDS						
RIVET	MS20426AD			MS20426DD		
RIVET DIA (IN.)	3/32	1/8	5/32	3/16	3/16	1/4
SHEET THICKNESS (IN.)						
0.020	132	147				
0.025	156	221	165			
0.032	178	272	300		306	
0.040	193	309	397	409	543	
0.050	206	340	479	583	758	891
0.063	216	363	523	705	886	1216
0.071		373	542	739	942	1353
0.080			560	769	992	1473
0.090			575	795	1035	1579
0.100				818	1073	1672
0.125				853	1131	1877
0.160						2000
0.190						2084
Shear	217	388	596	862	1180	2120

S265-3-92

NOTES

- SHEET GAUGE IS THAT OF COUNTERSUNK SHEET. IN CASES WHERE LOWER SHEET IS THINNER THAN UPPER, SHEAR-BEARING ALLOWABLE FOR LOWER SHEET-RIVET COMBINATION SHOULD BE COMPUTED.

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 208. Strength of Joints — MS20470 in 2024, 7075, and 7178 Aluminum Alloy Sheet

2024-T3 CLAD (AND 2024-T3 BARE)
ULTIMATE STRENGTH IN POUNDS

RIVET	MS20470AD		MS20470DD
RIVET DIA (IN.)	1/8	5/32	3/16
SHEET THICKNESS (IN.)			
0.020	210	263	
0.025	351	374	
0.032	374	551	
0.040	386	575	837
0.050	388	594	1046
0.063		596	1180
0.071			
0.080			
0.090			
0.100			
0.125	388	596	1180

2024-T42 CLAD (AND 2024-T42 BARE)
ULTIMATE STRENGTH IN POUNDS

RIVET	MS20470AD		MS20470DD
RIVET DIA (IN.)	1/8	5/32	3/16
SHEET THICKNESS (IN.)			
0.020	210	263	292
0.025	260	322	389
0.032	333	412	508
0.040	386	515	619
0.050	388	594	774
0.063		596	1047
0.071			1098
0.080			1180
0.090			
0.100			
0.125	388	596	1180

7075-T6 CLAD (AND 7075-T6 BARE)
ULTIMATE STRENGTH IN POUNDS

RIVET	MS20470AD		MS20470DD
RIVET DIA (IN.)	1/8	5/32	3/16
SHEET THICKNESS (IN.)			
0.020	294	339	402
0.025	357	455	548
0.032	374	551	777
0.040	386	575	1047
0.050	388	594	1147
0.063		596	1180
0.071			
0.080			
0.090			
0.100			
0.125	388	596	1180

7178-T6 CLAD (AND 7178-T6 BARE)
ULTIMATE STRENGTH IN POUNDS

RIVET	MS20470AD		MS20470DD
RIVET DIA (IN.)	1/8	5/32	3/16
SHEET THICKNESS (IN.)			
0.020	294	339	402
0.025	357	455	548
0.032	374	551	777
0.040	386	575	1047
0.050	388	594	1147
0.063		596	1180
0.071			
0.080			
0.090			
0.100			
0.125	388	596	1180

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Table 209. Strength of Joints — NAS1097 Rivets in 2024-T3 Bare (and Higher Strength) Aluminum Alloy Sheet

COUNTERSUNK—2024-T3 BARE [A]			
ULTIMATE STRENGTH IN POUNDS			
RIVET	NAS1097AD		NAS1097DD
RIVET DIA (IN.)	1/8	5/32	3/16
SHEET THICKNESS (IN.)			
0.032	290		
0.040	310	390	
0.050	335	440	680 [B]
0.060			810

S265-3-94

NOTES

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

[B] VALUE APPLIES WHEN LOWER SHEET IS 0.032 IN. OR GREATER. USE 600 LBS WHEN SECOND SHEET IS 0.025 IN.

Table 210. Strength of Joints — NAS1097 Rivets in 7178-T6 Bare Aluminum Alloy Sheets

COUNTERSUNK—7178-T6 BARE			
ULTIMATE STRENGTH IN POUNDS			
RIVET	NAS1097AD		NAS1097DD
RIVET DIA (IN.)	1/8	5/32	3/16
SHEET THICKNESS (IN.)			
0.025	265		
0.032		345	
0.040		390	475
0.050			680
0.060			810

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Table 211. Strength of Joints — HS47 Hi-Shear Rivets, and 7S36, 7S37, and 7S39 Screws in 2024-T4 Clad (and Higher Strength) Aluminum Alloy Sheet

FLUSH HEAD—2024-T4 CLAD A						
ULTIMATE STRENGTH IN POUNDS						
FASTENER	HS47 HI-SHEAR RIVETS; 7S36, 7S37, AND 7S39 SCREWS					
INSTALLATION	COUNTERSUNK			DIMPLED AND SUBCOUNTERSUNK		
SHEET THICKNESS (IN.)	HS47-6	HS47-8	HS47-10	HS47-6	HS47-8	HS47-10
0.032				645		
0.040				820	1078	
0.050	822			1027	1350	1691
0.063	1047	1369		1306	1734	2126
0.071	1191	1570	1875	1474	1953	2415
0.080	1350	1782	2168	1662	2200	2754
0.090	1515	2000	2500	1870	2484	3087
0.100	1695	2250	2763	2065	2768	3459
0.125	2080	2812	3490	2439	3481	4341
0.160	2648	3540	4500			
0.190		4182	5292			

S265-3-96

NOTE

A USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEETS.

Table 212. Strength of Joints — HS47 Hi-Shear Rivets, and 7S36, 7S37, and 7S39 Screws in 7075-T6 Clad (and Higher Strength) Aluminum Alloy Sheet

FLUSH HEAD—7075-T6 CLAD A						
ULTIMATE STRENGTH IN POUNDS						
FASTENER	HS47 HI-SHEAR RIVET; 7S36, 7S37, AND 7S39 SCREWS					
INSTALLATION	COUNTERSUNK			DIMPLED AND SUBCOUNTERSUNK		
SHEET THICKNESS (IN.)	HS47-6	HS47-8	HS47-10	HS47-6	HS47-8	HS47-10
0.032				801		
0.040				1006	1344	
0.050	1080			1260	1672	2107
0.063	1380	1800		1592	2113	2622
0.071	1575	2100	2400	1853	2388	2965
0.080	1770	2400	2775	2033	2700	3357
0.090	2010	2700	3220	2295	3038	3798
0.100	2220	3060	3660	2549	3381	4234
0.125	2650	3900	4675	2895	4250	5292
0.160		4600	5950			
0.190			6750			

S265-3-97

NOTE

A USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEETS.

Table 213. Strength of Joints — Protruding-head Steel Fasteners in 2024-T42 Aluminum Alloy Sheet

STEEL BOLTS AND HI-SHEAR RIVETS IN 2024-T42 SHEET

ULTIMATE STRENGTH IN POUNDS

FASTENER DIA (IN.)	3/16		1/4	
SHEET THICKNESS (IN.)	BARE	CLAD	BARE	CLAD
0.0341	613			
0.035	630			
0.036	648	547		
0.037	666			
0.038	684			
0.039	702			
0.040	720	608		
0.041	738			
0.042	756			
0.043	774			
0.044	792			
0.045	811	648		
0.046	829		1104	
0.047	848		1128	
0.048	866		1152	
0.049	884		1176	
0.050	902		1200	1012
0.051	920		1224	
0.052	938		1248	
0.053	955		1272	
0.054	973		1296	
0.055	991		1320	

FASTENER DIA (IN.)	3/16		1/4	
SHEET THICKNESS (IN.)	BARE	CLAD	BARE	CLAD
0.056	1009		1344	
0.057	1026		1368	
0.058	1044		1392	
0.059	1062		1416	
0.060	1080		1440	
0.061	1097		1464	
0.062	1115		1488	
0.063	1133	1027	1512	1370
0.064			1536	
0.065			1560	
0.066			1584	
0.067			1608	
0.068			1632	
0.069			1656	
0.070			1680	
0.071			1704	1544
0.072			1728	
0.073			1752	
0.074			1776	
0.075			1800	
0.076			1824	

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Table 214. Strength of Joints — Protruding-head Steel Fasteners in 2024-T4 Aluminum Alloy Sheet

STEEL BOLTS AND HI-SHEAR RIVETS IN 2024-T4 SHEET				
ULTIMATE STRENGTH IN POUNDS				
FASTENER DIA (IN.)	3/16		1/4	
	BARE	CLAD	BARE	CLAD
SHEET THICKNESS (IN.)				
0.0341	613			
0.035	630			
0.036	648	597		
0.037	666			
0.038	684			
0.039	702			
0.040	720	664		
0.041	738			
0.042	756			
0.043	774			
0.044	792			
0.045	811	748		
0.046	829		1104	
0.047	848		1128	
0.048	866		1152	
0.049	884		1176	
0.050	902	832	1209	1106
0.051	920		1224	
0.052	938		1248	
0.053	955		1272	
0.054	973		1296	
0.055	991		1320	
0.056	1009		1344	
0.057	1026		1368	
0.058	1044		1392	
0.059	1062		1416	
0.060	1080		1440	
0.061	1097		1464	
0.062	1115		1488	
0.063	1133	1080	1512	1441
0.064				
0.065				
0.066				
0.067				
0.068				
0.069				
0.070				
0.071				1624
0.072				
0.073				
0.074				
0.075				
0.076				

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Table 215. Strength of Joints — Protruding-head Steel Fasteners in 2024-T3 Aluminum Alloy Sheet

STEEL BOLTS AND HI-SHEAR RIVETS IN 2024-T3 SHEET

ULTIMATE STRENGTH IN POUNDS

FASTENER DIA (IN.)	3/16		1/4	
	BARE	CLAD	BARE	CLAD
SHEET THICKNESS (IN.)				
0.0341	757			
0.035	777			
0.036	800	739		
0.037	822			
0.038	844			
0.039	866			
0.040	889	821		
0.041	911			
0.042	933			
0.043	955			
0.044	978			
0.045	1001	925		
0.046	1024		1363	1259
0.047	1046		1392	
0.048	1069		1422	
0.049	1091		1452	
0.050	1114	1029	1481	1369
0.051	1135		1511	
0.052	1158		1540	
0.053	1179		1570	
0.054	1202		1600	
0.055	1223		1629	

FASTENER DIA (IN.)	3/16		1/4	
	BARE	CLAD	BARE	CLAD
SHEET THICKNESS (IN.)				
0.056	1245		1659	
0.057	1267		1689	
0.058	1289		1718	
0.059	1311		1748	
0.060	1333		1777	
0.061	1354		1807	
0.062	1376		1837	
0.063	1398	1310	1866	1748
0.064			1896	
0.065			1926	
0.066			1955	
0.067			1985	
0.068			2014	
0.069			2044	
0.070			2074	
0.071			2103	1970
0.072			2133	
0.073			2163	
0.074			2192	
0.075			2222	
0.076			2251	

S265-3-300

Table 216. Strength of Joints — Protruding-head Steel Fasteners in 7075-T6 Aluminum Alloy Sheet

STEEL BOLTS AND HI-SHEAR RIVETS IN 7075-T6 SHEET									
ULTIMATE STRENGTH IN POUNDS									
FASTENER DIA (IN.)	3/16		1/4		FASTENER DIA (IN.)	3/16		1/4	
	BARE	CLAD	BARE	CLAD		BARE	CLAD	BARE	CLAD
SHEET THICKNESS (IN.)					SHEET THICKNESS (IN.)				
0.0341	920				0.056	1566		2086	
0.035	945	898			0.057	1593		2123	
0.036	972				0.058	1621		2160	
0.037	999				0.059	1648		2198	
0.038	1025				0.060	1676		2235	
0.039	1053				0.061	1703		2272	
0.040	1117	1028			0.062	1730		2309	
0.041	1146				0.063	1758	1640	2347	2189
0.042	1173				0.064			2384	
0.043	1201				0.065			2421	
0.044	1229				0.066			2458	
0.045	1259	1158			0.067			2496	
0.046	1287		1713		0.068			2533	
0.047	1316		1751		0.069			2570	
0.048	1344		1788		0.070			2607	
0.049	1372		1825		0.071			2645	2467
0.050	1401	1288	1862	1712	0.072			2682	
0.051	1427		1900		0.073			2719	
0.052	1456		1937		0.074			2756	
0.053	1483		1974		0.075			2794	
0.054	1511		2011		0.076			2831	
0.055	1538		2049						

S265-3-301

Table 217. Strength of Joints — Protruding-head Steel Fasteners in 7178-T6 Aluminum Alloy Sheet

STEEL BOLTS AND HI-SHEAR RIVETS IN 7178-T6 SHEET									
ULTIMATE STRENGTH IN POUNDS									
FASTENER DIA (IN.)	3/16		1/4		FASTENER DIA (IN.)	3/16		1/4	
	BARE	CLAD	BARE	CLAD		BARE	CLAD	BARE	CLAD
SHEET THICKNESS (IN.)					SHEET THICKNESS (IN.)				
0.0341	1010				0.056	1682		2240	
0.035	1036				0.057	1710		2280	
0.036	1066	972			0.058	1741		2320	
0.037	1097				0.059	1770		2360	
0.038	1125				0.060	1800		2400	
0.039	1155				0.061	1829		2440	
0.040	1185	1080			0.062	1858		2480	
0.041	1215				0.063	1888	1746	2520	2331
0.042	1243				0.064			2560	
0.043	1273				0.065			2600	
0.044	1303				0.066			2640	
0.045	1352	1251			0.067			2680	
0.046	1382		1840		0.068			2720	
0.047	1413		1880		0.069			2760	
0.048	1443		1920		0.070			2800	
0.049	1474		1960		0.071			2840	2627
0.050	1504	1391	2000	1850	0.072			2880	
0.051	1533		2040		0.073			2920	
0.052	1563		2080		0.074			2960	
0.053	1592		2120		0.075			3000	
0.054	1622		2160		0.076			3040	
0.055	1651		2200						

S265-3-302

Table 218. **Strength of Joints — MS20601 and MS20603 (Blind) Rivets in 2024-T3 Clad (and Higher Strength) Aluminum Alloy Sheet**

DIMPLED — 2024-T3 CLAD [A]		
ULTIMATE STRENGTH IN POUNDS		
RIVET	MS20601AD	
RIVET DIA (IN.)	1/8	5/32
MATERIAL THICKNESS (IN.)		
0.020	200	300
0.025	220	335
0.032	260	390
0.040	295	450
0.050	330	500
0.063		540

COUNTERSUNK — 2024-T4 CLAD [A]				
ULTIMATE STRENGTH IN POUNDS				
RIVET	MS20601AD		MS20603AD	
RIVET DIA (IN.)	1/8	5/32	3/16	1/4
SHEET THICKNESS (IN.) [B]				
0.040	159			
0.050	236	258		
0.063	327	369	398	
0.071	360	439	485	
0.080	388	511	577	654
0.090	388	561	684	795
0.100		596	768	945
0.125		596	862	1270

S265-3-303

NOTES

[A] USE ALSO FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEETS

[B] SHEET THICKNESS OF COUNTERSUNK SHEET.

Table 219. **Strength of Joints — MS20600 and MS20602 (Blind) Rivets in 2024-T4 Clad (and Higher Strength) Aluminum Alloy Sheet**

PROTRUDING — 2024-T4 CLAD [A]				
ULTIMATE STRENGTH IN POUNDS				
RIVET	MS20600AD AND / OR MS20602AD			
RIVET DIA (IN.)	1/8	5/32	3/16	1/4
SHEET THICKNESS (IN.)				
0.020	186			
0.025	233	286		
0.032	277	368	445	601
0.040	321	425	544	750
0.050	386	506	643	961
0.063	388	596	753	1110
0.071	388	596	823	1200
0.080			862	1305
0.090			862	1415
0.100				1548
0.125				1550

S265-3-304

NOTE

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 220. Strength of Joints — CR22481 (Blind) Rivets in 2024-T42 Clad (and Higher Strength) Aluminum Alloy Sheet

DIMPLED — 2024-T42 CLAD [A]		
ULTIMATE STRENGTH IN POUNDS		
RIVET	CR2248-4	CR2248-5
RIVET DIA (IN.)	1/8	5/32
SHEET THICKNESS (IN.)		
0.020	199	251
0.025	239	303
0.032	299	379
0.040	368	461
0.050	452	567
0.063	498	691
0.071		727
0.080		767

COUNTERSUNK — 2024-T42 CLAD [A]		
ULTIMATE STRENGTH IN POUNDS		
RIVET	CR2248-4	CR2248-5
RIVET DIA (IN.)	1/8	5/32
SHEET THICKNESS (IN.)		
0.032	149	
0.040	235	236
0.050	340	364
0.060	459	536
0.070	498	636
0.080	541	712
0.090		773
0.100		833

S265-3-305

NOTE

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 221. **Strength of Joints — CR2249 (Blind) Rivets in 2024-T42 Clad (and Higher Strength) Aluminum Alloy Sheet**

PROTRUDING — 2024-T42 CLAD [A]		
ULTIMATE STRENGTH IN POUNDS		
RIVET	CR2249	
RIVET DIA (IN.)	1/8	5/32
SHEET THICKNESS (IN.)		
0.020	210	258
0.025	260	324
0.032	332	409
0.040	418	515
0.050	520	642
0.060	653	809
0.070		910
0.080		1024
0.090		

S265-3-306

NOTE

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 222. **Strength of Joints — Huck CKL 100V (Blind) Rivets in 2024-T4 Clad (and Higher Strength) Aluminum Alloy Sheet**

FLUSH—2024-T4 CLAD A						
ULTIMATE STRENGTH IN POUNDS						
INSTALLATION	COUNTERSUNK			DIMPLED		
RIVET	100V4	100V5	100V6	100V4	100V5	100V6
SHEET THICKNESS (IN.)						
0.025				205	280	
0.032				248	324	426
0.040	159			296	390	495
0.050	236	258		374	466	588
0.063	327	369	398	390	554	686
0.071	360	439	485		610	755
0.080	388	511	577			800
0.090	↑	561	684			
0.100	↓	596	862			
0.125	388	596	862			

S265-3-307

NOTE

A USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 223. Strength of Joints — NAS1398B (CR2263) and NAS1399B (CR2262) (Blind) Rivets in 2024-T3 Clad (and Higher Strength) Aluminum Alloy Sheets

PROTRUDING HEAD—2024-T3 CLAD [A]			
ULTIMATE STRENGTH IN POUNDS			
RIVET	NAS1398B4	NAS1398B5	NAS1398B6
SHEET THICKNESS (IN.)			
0.016	71		
0.020	132	111	
0.025	203	204	183
0.032	292	329	336
0.040	323	453	518
0.050	363	498	661
0.063	388	559	737
0.071	↕	596	785
0.080	388	596	832

COUNTERSUNK—2024-T3 CLAD [A]			
ULTIMATE STRENGTH IN POUNDS			
RIVET	NAS1399B4	NAS1399B5	NAS1399B6
SHEET THICKNESS (IN.)			
0.032	25		
0.040	88	42	
0.050	174	144	82
0.063	279	277	241
0.071	345	345	345
0.080	388	451	454
0.090	↕	553	574
0.100	↕	↕	700
0.112	↕	↕	845
0.125	↕	↕	↕
0.140	388	553	845

S265-3-308

NOTE

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET MATERIALS.

Table 224. Strength of Joints — F Series Jo-bolts (Blind) in 2024-T4 Clad (and Bare) Aluminum Alloy Sheet and Plate

FLUSH HEAD—2024-T4 CLAD (AND BARE)		
FASTENER	F 164	
	ULTIMATE STRENGTH IN POUNDS	
INSTALLATION	COUNTERSUNK	DIMPLED AND SUBCOUNTERSUNK
SHEET THICKNESS (IN.)		
0.025		289
0.032	240	377
0.040	375	471
0.050	555	592
0.063	780	746
0.071	930	841
0.080	1080	948
0.090	1245	
0.100	1395	
0.125	1680	
0.160	1695	

S265-3-309

Table 225. Strength of Joints — F Series Jo-bolts (Blind) in 2024-T3 Clad (and Bare) Aluminum Alloy Sheet and Plate

COUNTERSUNK—2024-T3 CLAD (AND BARE)			
ULTIMATE STRENGTH IN POUNDS			
SHEET THICKNESS (IN.)	RIVET		
	F 200	F 260	F 312
0.032	420		
0.040	445	480	
0.050	510	510	
0.063	915	1035	1305
0.071	1027	1170	1395
0.080	1155	1320	1500
0.090	1305	1485	1635
0.100	1470	1680	1800
0.125	1800	2070	2160
0.160	2160	2550	2730
0.190	2400	3015	3300
0.250	2620	3900	4425

S265-3-310

Table 226. Strength of Joints — F Series Jo-bolts (Blind) in 7075-T6 Clad (and Higher Strength) Aluminum Alloy Sheet and Plate

COUNTERSUNK—7075-T6 CLAD A			
ULTIMATE STRENGTH IN POUNDS			
RIVET	F 200	F 260	F 312
SHEET THICKNESS (IN.)			
0.032	520		
0.040	545	580	
0.050	645	645	
0.063	1155	1185	1425
0.071	1275	1305	1500
0.080	1395	1470	1605
0.090	1537	1665	1740
0.100	1695	1920	1920
0.125	1960	2400	2310
0.160	2200	3075	2970
0.190	2420	3705	3780
0.250	2620	4320	5565

S265-3-311

NOTE

A USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET AND PLATE.

Table 227. Strength of Joints — FA Series Jo-bolts (Blind) in 2024-T3 Clad (and Bare) Aluminum Alloy Sheet and Plate

COUNTERSUNK—2024-T3 CLAD (AND BARE)		
ULTIMATE STRENGTH IN POUNDS		
SHEET THICKNESS (IN.)	RIVET	
	FA 200	FA 260
0.032	390	
0.040	420	620
0.050	500	790
0.063	640	1010
0.071	790	1150
0.080	1040	1310
0.090	1270	1480
0.100	1450	1680
0.125	1595	2010
0.160	1595	2300
0.190		2520
0.250		2790

S265-3-312

Table 228. **Strength of Joints — FA Series Jo-bolts (Blind) in 7075-T6 Clad (and Higher Strength) Aluminum Alloy Sheets and Plate**

COUNTERSUNK—7075-T6 CLAD [A]		
ULTIMATE STRENGTH IN POUNDS		
FASTENER	FA 200	FA 260
SHEET THICKNESS (IN.)		
0.032	450	
0.040	500	740
0.050	590	940
0.063	750	1170
0.071	880	1310
0.080	1060	1480
0.090	1270	1650
0.100	1450	1850
0.125	1595	2250
0.160	1595	2650
0.190		2790

S265-3-313

NOTE

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET AND PLATE.

Table 229. Strength of Joints — P Series Jo-bolts (Blind) in 2024-T4 Clad (and Higher Strength) Aluminum Alloy Sheet and Plate

PROTRUDING HEAD—2024-T4 CLAD [A]				
ULTIMATE STRENGTH IN POUNDS				
FASTENER	P 164	P 200	P 260	P 312
SHEET THICKNESS (IN.)				
0.025	350	430	574	
0.032	450	560	710	875
0.040	565	690	895	1090
0.050	706	864	1115	1338
0.063	888	1080	1420	1702
0.071	1002	1220	1588	1906
0.080	1130	1372	1785	2160
0.090	1270	1550	2011	2408
0.100	1412	1720	2230	2675
0.125	1620	2130	2788	3356
0.160	1695	2460	3565	4305
0.190		2580	4008	5098
0.250			4360	5984

S265-3-314

NOTE

[A] USE FOR ALL HIGHER STRENGTH ALUMINUM ALLOY SHEET AND PLATE.

TYPICAL REPAIR EXAMPLES

REPAIR

CONSTANT-THICKNESS SKIN REPAIR WITHIN A SUBSTRUCTURE (INCLUDES SPLICES)

Instructions for developing a constant-thickness skin repair between frames or ribs are given in the basic repair calculations. (Refer to figure 201, 51-70-20.)

SKIN AND WEB CRACK REPAIR

Instructions for skin and web crack repair are given in figure 201.

CONSTANT—THICKNESS SKIN REPAIR ACROSS A SUBSTRUCTURE

See figure 202.

CHEM-MILLED SKIN REPAIR BETWEEN LANDS—NONPRESSURIZED

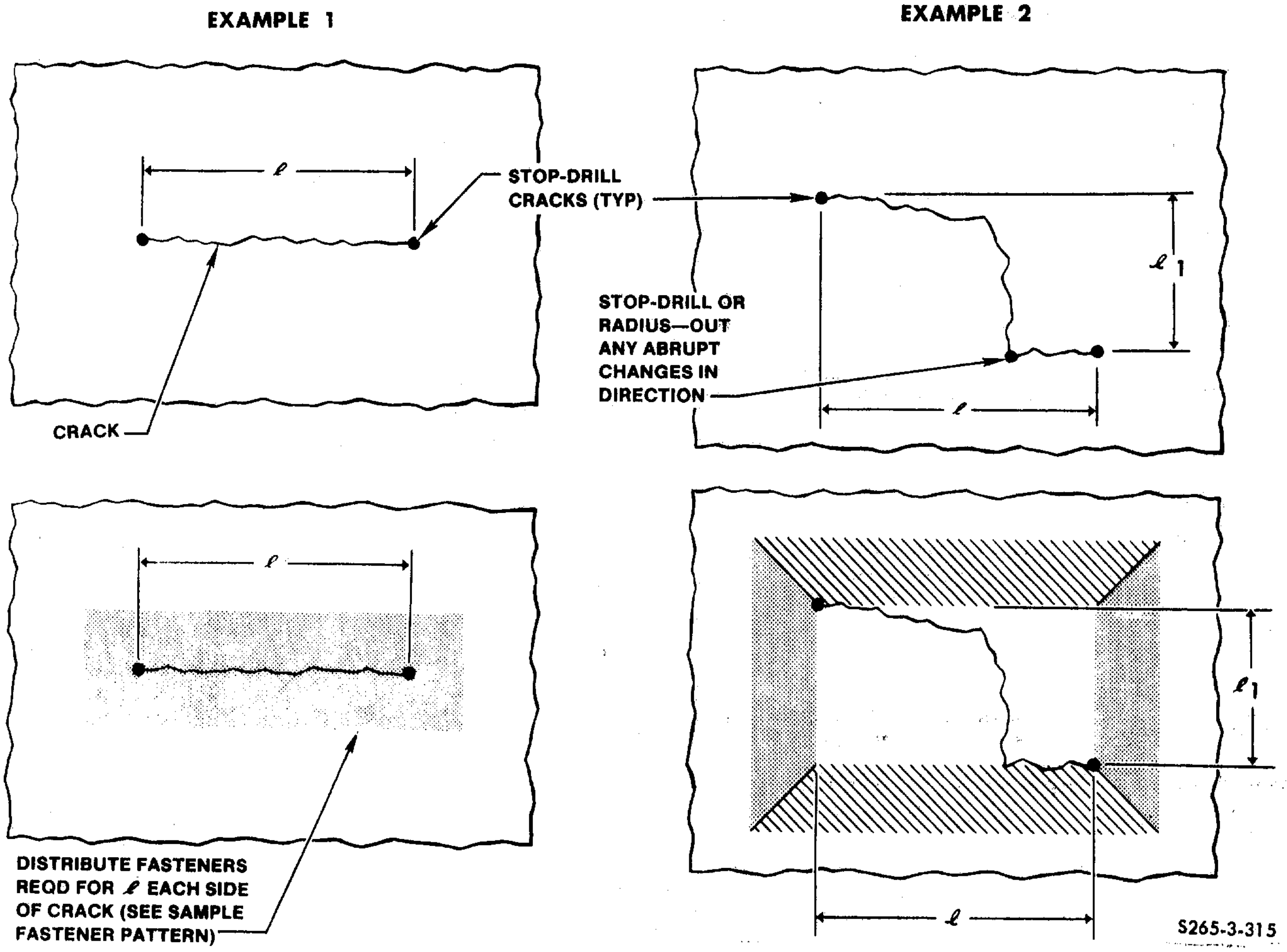
See figure 203.

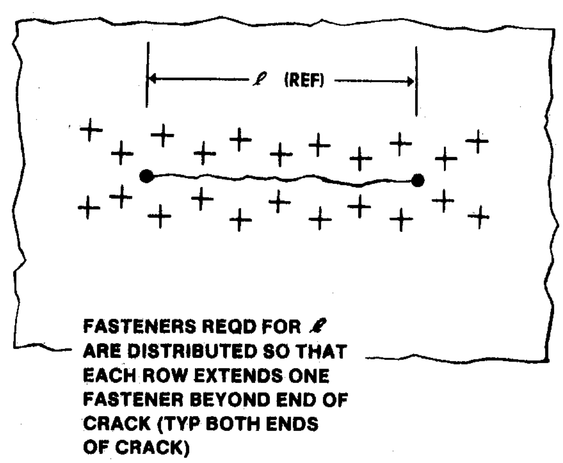
CHEM-MILLED SKIN REPAIR ACROSS A SKIN LAND — NONPRESSURIZED

See figure 204.

SYMBOLS USED IN THIS ILLUSTRATION

ℓ—Length of cut along one side of damage
ℓ_1—Length of cut (effective) along a second side of damage





NOTES

- THIS ILLUSTRATION PROVIDES SPECIAL INSTRUCTIONS NECESSARY FOR ADAPTING OTHER REPAIRS SHOWN IN THIS SECTION TO REPAIR OF CRACKED SKINS AND WEBS.
- IT ESSENTIALLY INDICATES THAT: (1) CRACKS WHICH ARE GENERALLY STRAIGHT (EXAMPLE 1) HAVE ONE ℓ DIMENSION AND MAY BE CONSIDERED AS A BUTT JOINT REQUIRING A SPLICE DOUBLER. (2) CRACKS WHICH ARE NOT GENERALLY STRAIGHT (EXAMPLE 2) HAVE TWO ℓ DIMENSIONS AND MUST BE TREATED AS RECTANGULAR HOLES. THAT IS, A RECTANGULAR HOLE WOULD RESULT IF THE STRUCTURALLY NONEFFECTIVE MATERIAL WERE REMOVED. STRUCTURALLY NONEFFECTIVE MATERIAL IN THIS TYPE OF REPAIR SERVES PURPOSE OF A FILLER IN A FLUSH REPAIR.
- ALL REQUIREMENTS OF REPAIR BEING ADOPTED TO CRACKED CONDITION MUST BE MET.
- SEE "BASIC FASTENER CALCULATIONS" AND "GENERAL REPAIR REQUIREMENTS," 51-70-20, FOR GENERAL REPAIR DEVELOPMENT INSTRUCTIONS.

Skin and Web Crack Repair
Figure 201

SYMBOLS USED IN THIS ILLUSTRATION

- F_{su} — Ultimate shear stress
- F_{tu} — Ultimate tensile stress
- ℓ — Length of cut along one side of cutout.
- ℓ_1 — Length of cut along a second side of cutout.
- S — Original fastener spacing
- S_1 — Repair fastener spacing (min)
- t — Thickness of material being repaired

SAMPLE CALCULATIONS (from data given in sketch)

TENSION SIDES OF REPAIR—

$$\frac{(\ell \times t) \times F_{tu}}{\text{Fastener allowable}} = \text{No. of fasteners required on each tension side of repair}$$

$$\frac{(2 \times 0.040) \times 58{,}000}{635} = 7.14 \text{ or } 7 \text{ rivets}$$

SHEAR SIDES OF REPAIR—

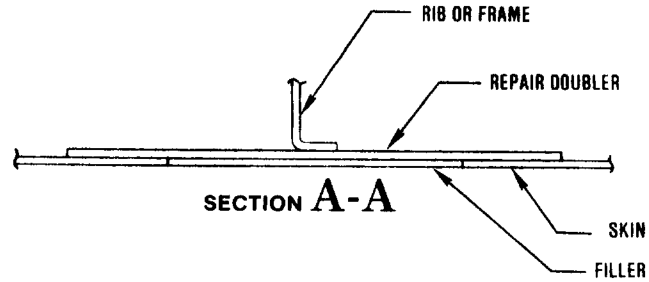
$$\frac{(\ell_1 \times t) \times F_{su}}{\text{Fastener allowable}} = \text{No. of fasteners required on each side of repair (in addition to fasteners thru frame or rib)}$$

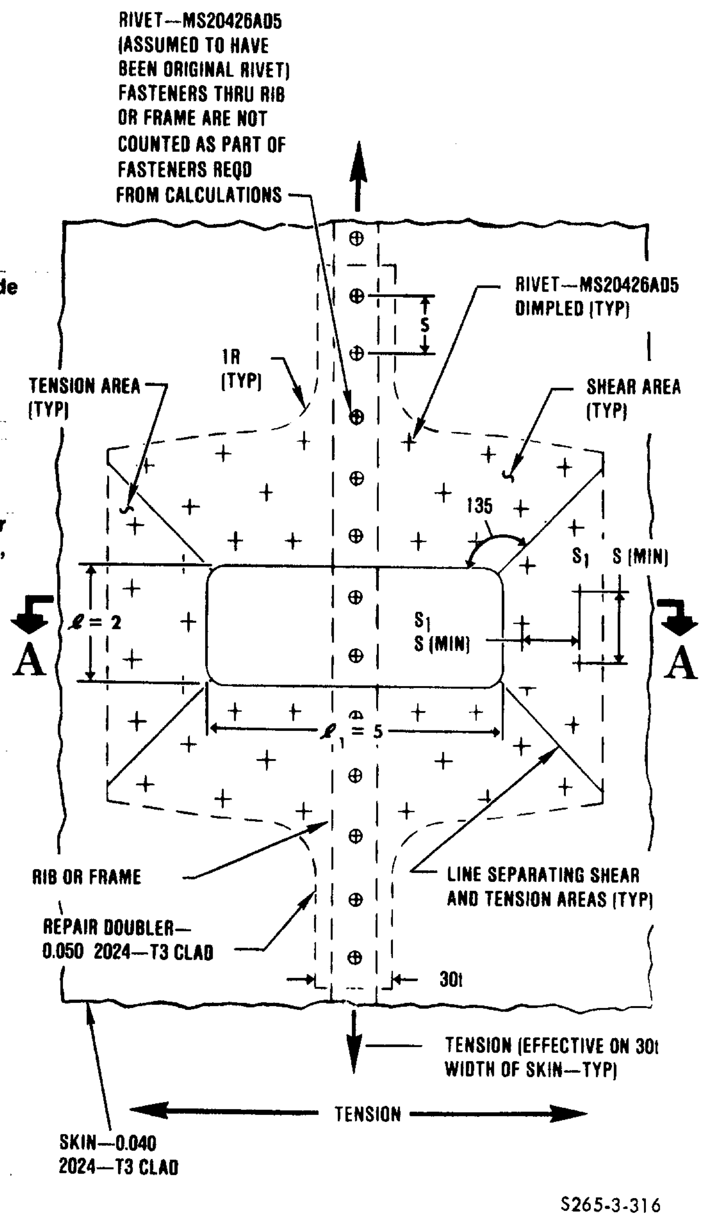
$$\frac{5 \times 0.040 \times 38{,}000}{635} = 10.3 \text{ or } 11 \text{ rivets}$$

$$\frac{(30t \times t) \times F_{tu}}{\text{Fasteners allowable}} = \text{No. of fasteners thru substructure each side of repair}$$

Fasteners through skin, repair doubler, and substructure (rib or frame) must have fastener allowables equal to, or greater than, those removed. Solve for numbers as follows:

$$\frac{1.2 \times 0.040 \times 58{,}000}{635} = 4.4 \text{ or } 5 \text{ rivets}$$

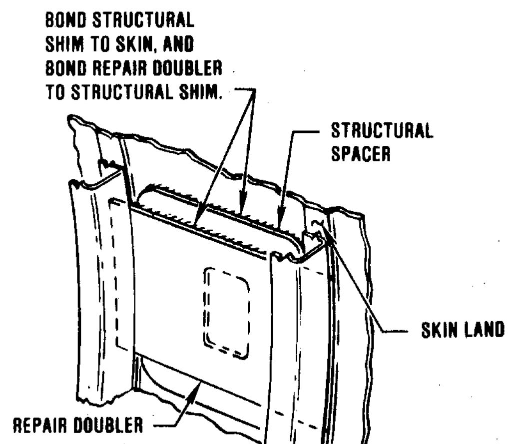




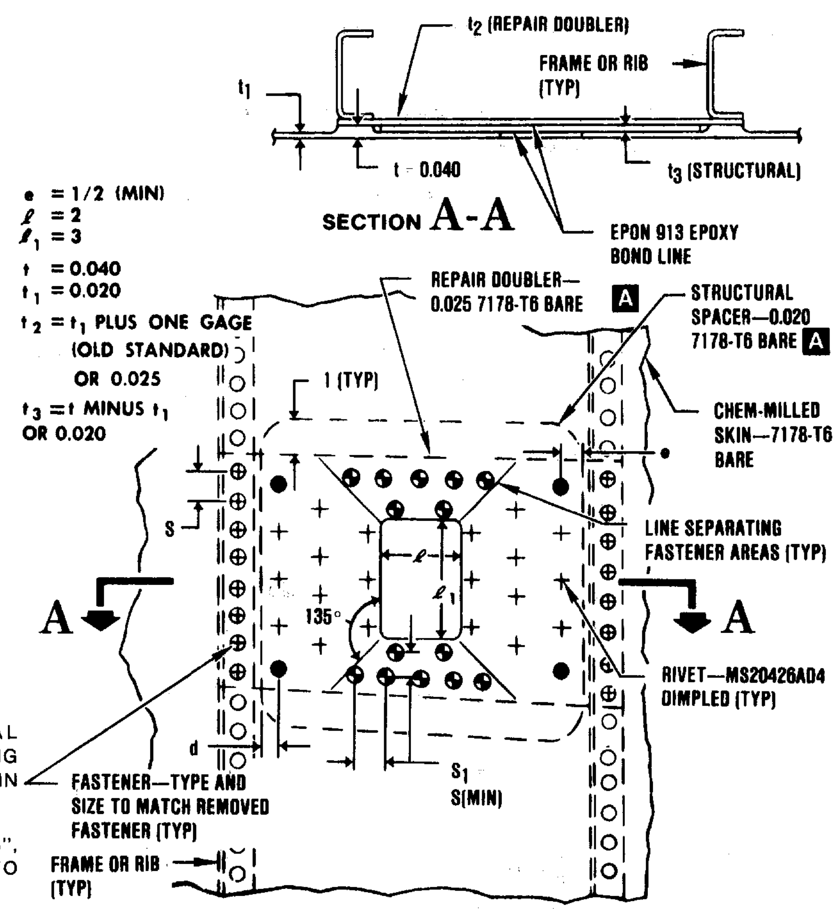
NOTES

- THIS ILLUSTRATION PROVIDES SPECIAL INSTRUCTIONS NECESSARY FOR DEVELOPING SHEAR OR TENSION REPAIRS ACROSS A SUBSTRUCTURE (FRAME, LONGERON, STIFFENER, OR RIB.)
- INSTRUCTIONS APPLY TO CONSTANT THICKNESS MATERIALS AND ONE-PIECE DOUBLERS ONLY.
- A TENSION REPAIR IS USED AS AN EXAMPLE. A SHEAR REPAIR WOULD BE IDENTICAL TO TENSION REPAIR EXCEPT THAT FASTENER CALCULATIONS WOULD BE FOR SHEAR VALUES ON ALL SIDES OF REPAIR.
- SKIN AREAS ADJACENT TO FRAME, LONGERON, STIFFENER, OR RIB FASTENER ROWS CARRY TENSION LOADS REGARDLESS OF PRIMARY LOAD IN PANEL. EFFECTIVE DISTANCE OF THIS LOADING IS 15 TIMES SKIN THICKNESS EACH SIDE OF FASTENER ROW, AND IS EXPRESSED AS 30t. REPAIR DOUBLER TABS, AT 30t WIDTH, EXTEND ALONG THESE FASTENERS ROWS PICKING UP FASTENERS AS REQUIRED TO DEVELOP 30t CAPABILITY OF MATERIAL (SEE SKETCH).
- SEE "BASIC FASTENER CALCULATIONS" AND "GENERAL REPAIR REQUIREMENTS," 51-70-20, FOR GENERAL REPAIR DEVELOPMENT INSTRUCTIONS.

Constant-thickness Skin Repair Across A Substructure
Figure 202



VIEW FROM SKETCH 1 (ROTATED)



SKETCH 1—SHEAR REPAIR WITHIN ONE BAY S265-3-317

NOTES

- THIS ILLUSTRATION PROVIDES SPECIAL INSTRUCTIONS NECESSARY FOR DETERMINING REPAIR REQUIREMENTS FOR SHEAR REPAIRS IN NONPRESSURIZED CHEM-MILLED AREAS.
- REFER TO "BASIC FASTENER CALCULATIONS", 51-70-20, FOR GENERAL DATA RELATIVE TO FASTENER REQUIREMENTS.
- REFER TO "GENERAL REPAIR REQUIREMENTS," 51-70-20, FOR REPAIR DOUBLER INFORMATION, TRIM RADII, AND RELATED DATA.
- IT WILL BE NOTED THAT REPAIR FASTENER REQUIREMENTS ARE COMPUTED FOR t_1, OR CHEM-MILLED, MATERIAL THICKNESS. DOUBLER MUST, EXTEND COMPLETELY ACROSS DAMAGED BAY AND PICK UP RIVETS THROUGH SKIN LAND AND SUBSTRUCTURE AS SHOWN IN SKETCH 1. NUMBER OF FASTENERS ARRIVED AT FROM CALCULATIONS ARE MINIMUM REQUIRED UNDER RELATIVELY IDEAL CIRCUMSTANCES. ADDITIONAL "FIELD" FASTENERS WILL USUALLY BE REQUIRED ON ONE OR BOTH SIDES OF REPAIR BETWEEN CUTOUT AND FRAME OR RIB. (SEE ACCOMPANYING SKETCHES.) FIELD FASTENERS MUST BE SAME AS OTHER FASTENERS USED IN REPAIR AND MUST BE SPACED AT 1.5 IN. (MAXIMUM).
- REPAIR DOUBLER (t_2) MUST BE OF SAME MATERIAL AS DAMAGED PART AND ONE GAUGE HEAVIER (OLD STANDARD) THAN CHEM-MILLED THICKNESS (t_1).
- SEE SHEET 2 FOR VARIATIONS OF THIS REPAIR AND DATA RELATIVE TO FABRICATION AND INSTALLATION.
- STRUCTURAL SHIM (t_3) MUST BE OF SAME MATERIAL AS DAMAGED PART AND EQUAL TO CHEM-MILLED THICKNESS (t_1).
- REFER TO STEPS ON SHEET 2.

A PARTS TO BE BONDED MUST BE MADE FROM BARE ALUMINUM ALLOYS.

LEGEND

⊕ Rivets required each side of ℓ

+ Rivets required each side of ℓ_1

● Field rivets added to calculated requriements to complete rivet pattern

SYMBOLS USED IN THIS ILLUSTRATION

- **e —Minimum fastener edge distance**
- **ℓ —Length of cut along one side of cutout**
- **ℓ_1 —Length of cut along a second side of cutout**
- **F_{su}—Ultimate shear stress**
- **S —Original fastener spacing**
- **S_1 —Repair fastener spacing (minimum)**
- **t —Basic material thickness**
- **t_1 —Chem-milled material thickness**
- **t_2 —Repair doubler thickness**
- **t_3 —Structural shim thickness**

SAMPLE CALCULATIONS FOR SHEAR REPAIR, USING DATA FROM SKETCH 1

$$\frac{(\ell \times t_1) \times F_{su}}{\text{Fastener allowable}} = \text{no. of fasteners required each side of } \ell.$$

$$\frac{2 \times 0.020 \times 50{,}000 \text{ lb}}{302 \text{ lb}} = 6.6 \text{ or } 7 \text{ rivets}$$

$$\frac{(\ell_1 \times t_1) \times F_{su}}{\text{Fastener allowable}} = \text{no. of fasteners required along each side of } \ell_1.$$

$$\frac{3 \times 0.020 \times 50{,}000 \text{ lb}}{302 \text{ lb}} = 9.9 \text{ or } 10 \text{ rivets}$$

Chem-milled Skin Repair Between Lands — Nonpressurized
Figure 203 (Sheet 1 of 3)

VARIATIONS FOR TENSION REPAIR, USING DATA FROM SKETCH 2

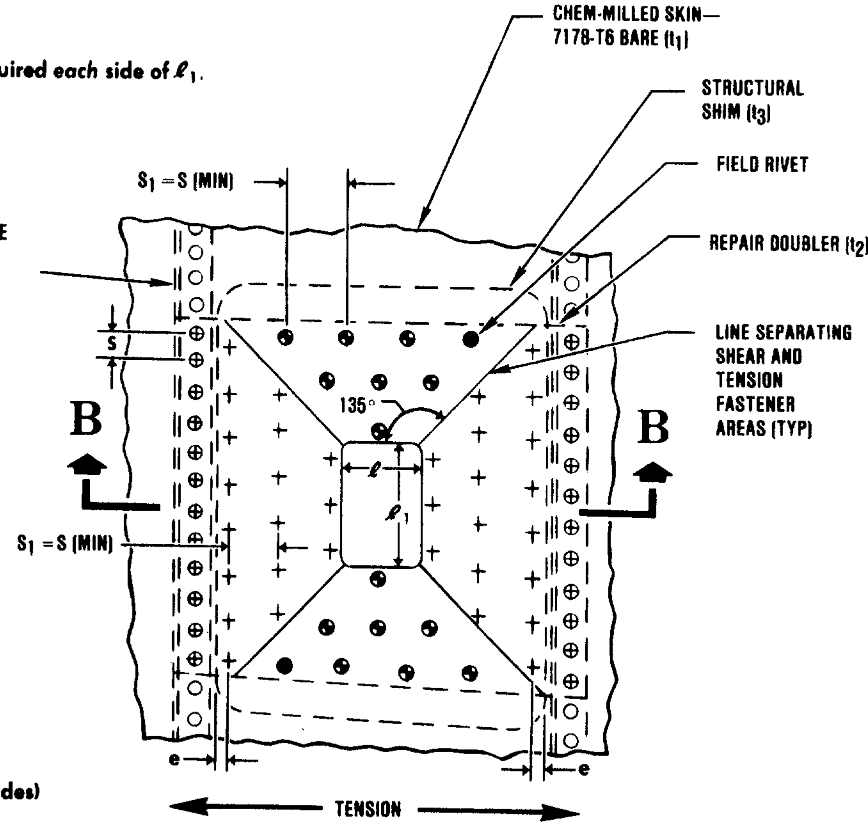
Calculations for ℓ (shear side) are as given for shear repair.

Calculations for ℓ_1 (tension side)

$$\frac{(\ell_1 \times t_1) \times F_{tu}}{\text{Fastener allowable}} = \text{no. of fasteners required each side of } \ell_1.$$

$$\frac{(3 \times 0.020) \times 83{,}000}{302} = 16.4 \text{ or } 17 \text{ rivets}$$

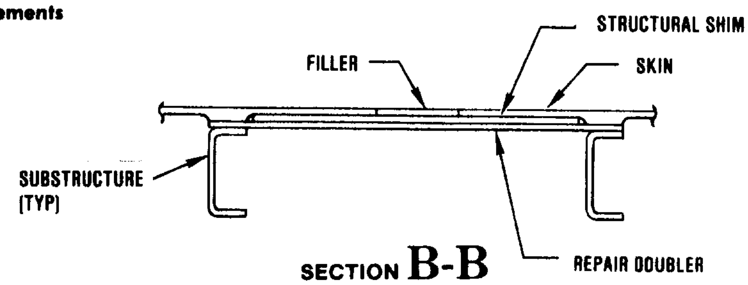
e = (1/2 MIN)
ℓ = 2
ℓ_1 = 3
t = 0.040
t_1 = -.020
t_2 = t_1 PLUS ONE GAUGE (OLD STANDARD) OR 0.025
t_3 = t_1 OR 0.020
S = ORIGINAL FASTENER SPACING
S_1 = REPAIR FASTENER SPACING (MIN)



SKETCH 2—TENSION REPAIR, ONE BAY

LEGEND

- ⊕ **Fasteners required each side of ℓ (shear sides)**
- \+ **Fasteners required each side of ℓ_1 (tension sides)**
- ● **Field rivets added to calculated requirements to complete rivet pattern**



SECTION B-B

1 Trim out damage.

2 Fabricate and fit repair parts.

3 Drill all fastener holes to final size.

4 Disassemble repair and burr all parts.

5 Prepare repair parts and inner skin surface for bonding. (Refer to "Adhesive Bonding" in 51-20-20 for surface preparation and structural metal-to-metal bonding.)

6 Bond and rivet repair parts in place. Bond with Epon 913.

CAUTION

ALL RIVETING MUST BE ACCOMPLISHED WHILE EPOXY IS IN PLASTIC STATE. RIVETING A CURED REPAIR WILL DESTROY BOND.

NOTE

SEE SHEET 3 FOR REPAIR WHEN DAMAGE IS ADJACENT (OR CLOSE) TO A RIB OR FRAME.

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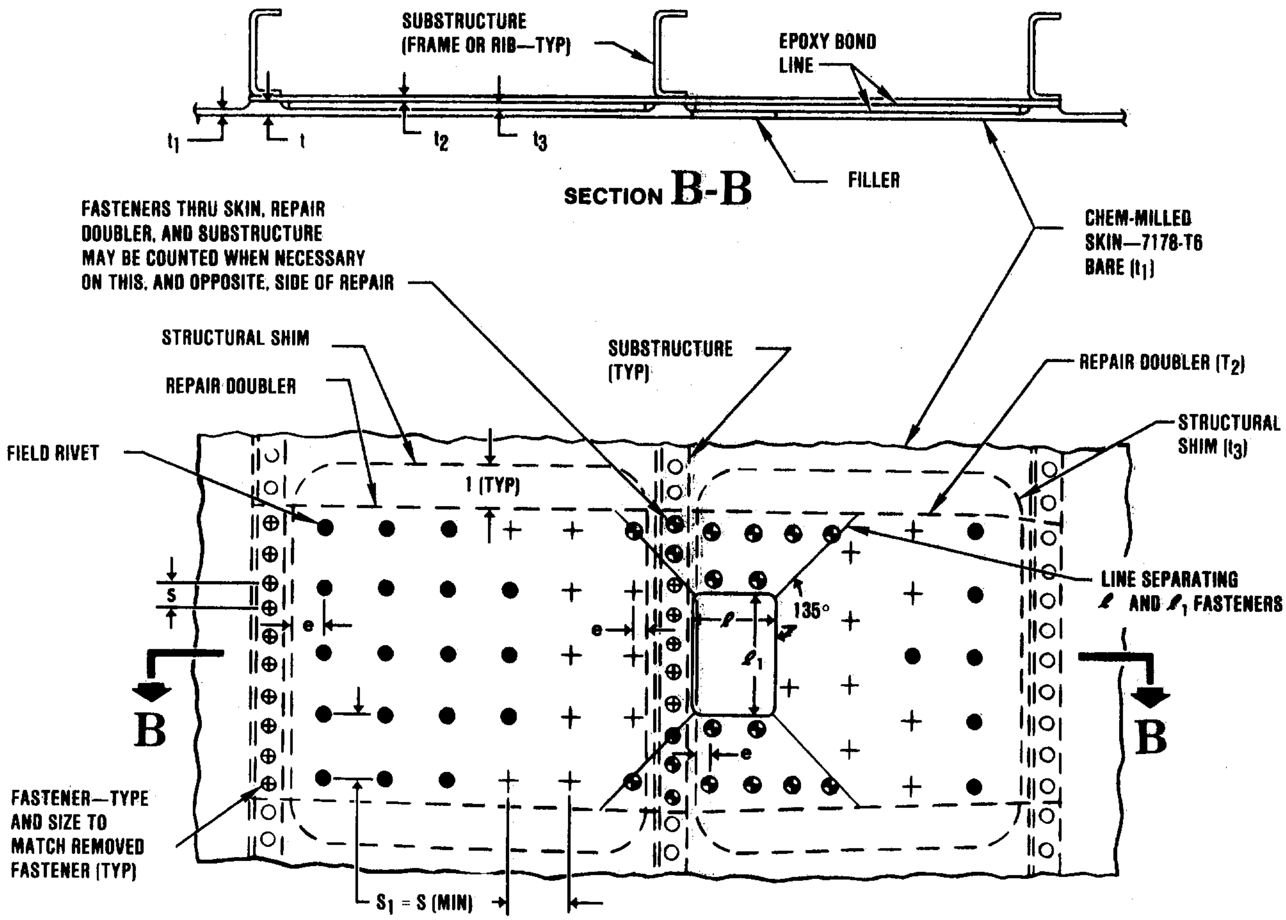
Chem-milled Skin Repair Between Lands — Nonpressurized
Figure 203 (Sheet 2 of 3)

e = (1/2 MIN)
ℓ = 2
ℓ_1 = 3
t = 0.040
t_1 = -.020
t_2 = t_1 PLUS ONE GAUGE (OLD STANDARD) OR 0.025
t_3 = t_1 OR 0.020
S = ORIGINAL FASTENER SPACING
S_1 = REPAIR FASTENER SPACING (MIN)

VARIATIONS FOR REPAIR WHEN DAMAGE IS ADJACENT TO A FRAME OR RIB, USING DATA FROM SKETCH 3

A shear example is used; a tension repair is identical except for fastener requirements on tension sides of repair.

Calculations for finding fastener requirements are same as given for sketch 1.



SKETCH 3—SHEAR REPAIR WITH DAMAGE ADJACENT TO FRAME OR RIB

LEGEND

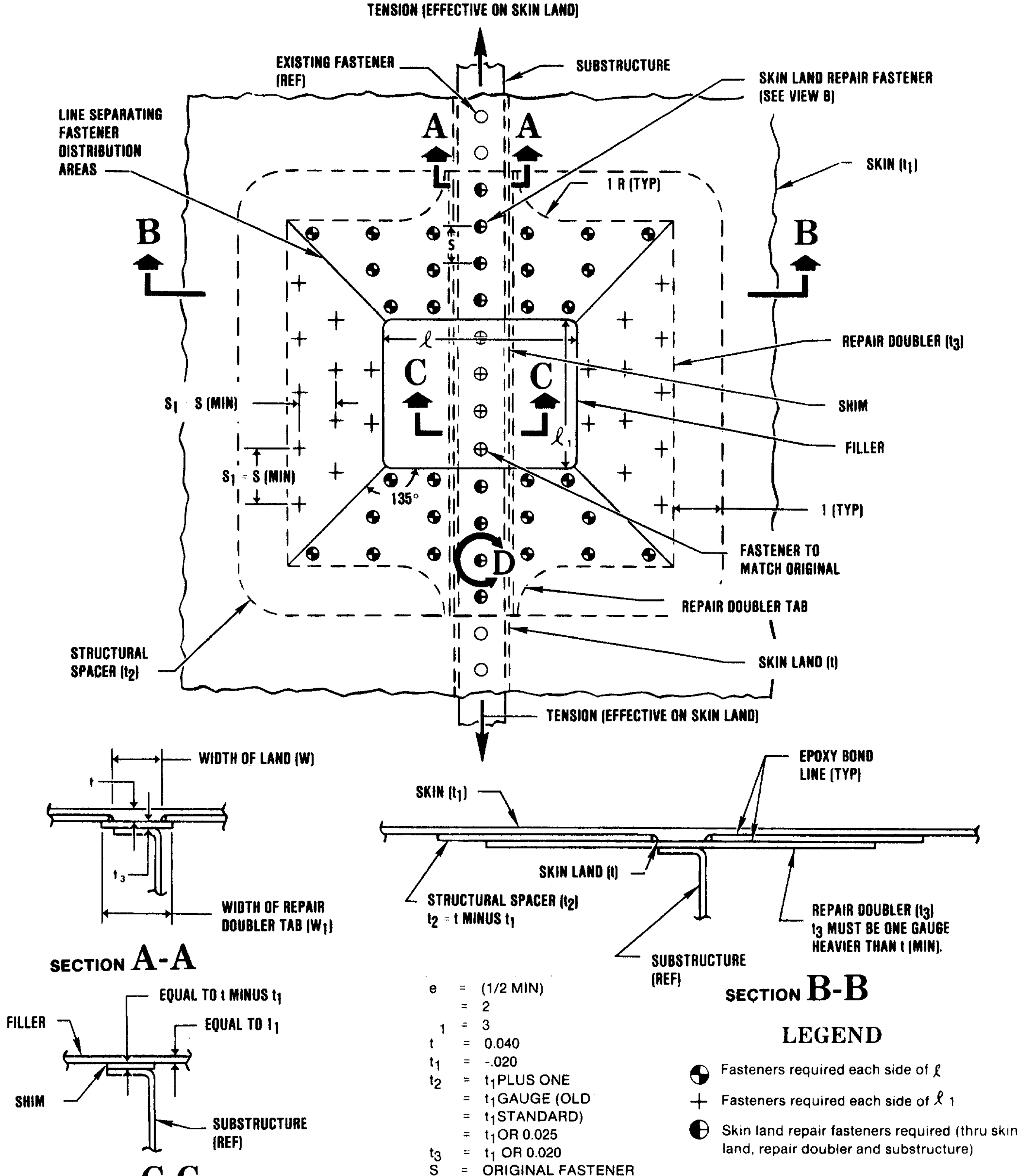
- ⊕ Fasteners required each side of ℓ
- + Fasteners required each side of ℓ_1
- ● Field rivets added to calculated requirements to complete rivet pattern

NOTES

- WHEN REQUIRED FASTENERS CANNOT BE INSTALLED WITHIN A BAY, REPAIR DOUBLER MUST EXTEND ACROSS ADJOINING BAY. FIELD RIVETS MUST BE ADDED AT 1.5 IN. MAXIMUM SPACING AS SHOWN.
- REFER TO STEPS ON SHEET 2.

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Chem-milled Skin Repair Between Lands — Nonpressurized
Figure 203 (Sheet 3 of 3)



e = (1/2 MIN)
= 2
1 = 3
t = 0.040
t_1 = -.020
t_2 = t_1 PLUS ONE
= t_1 GAUGE (OLD
= t_1 STANDARD)
= t_1 OR 0.025
t_3 = t_1 OR 0.020
S = ORIGINAL FASTENER SPACING
S_1 = REPAIR FASTENER SPACING (MIN)

LEGEND

- Fasteners required each side of ℓ
- + Fasteners required each side of ℓ 1
- Skin land repair fasteners required (thru skin land, repair doubler and substructure)

NOTE

AREA OF REPAIR DOUBLER TAB MUST BE EQUAL TO "A" OF SKIN LAND.

Chem-milled Skin Repair Across A Skin Land — Nonpressurized
Figure 204 (Sheet 1 of 2)

1 Trim damage midway between existing fasteners.

2 Lay out fastener pattern.

3 Fabricate repair parts.

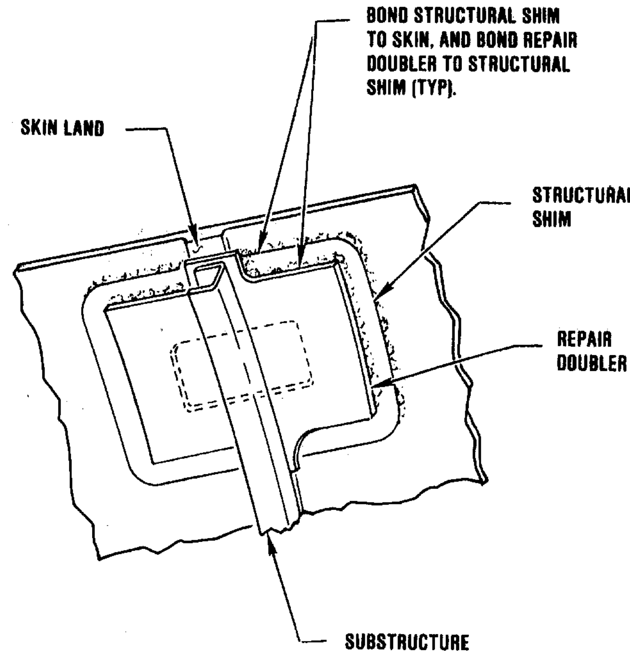
4 Assemble repair parts and drill fastener holes.

5 Disassembly repair and prepare skin and repair parts for bonding. (Refer to "Surface Preparation of Aluminum Alloys for Adhesive Bonding", 51-20-20.)

6 Bond and rivet repair parts in place. (Refer to "Structural Metal-to-Metal Bonding", 51-20-20.)

CAUTION

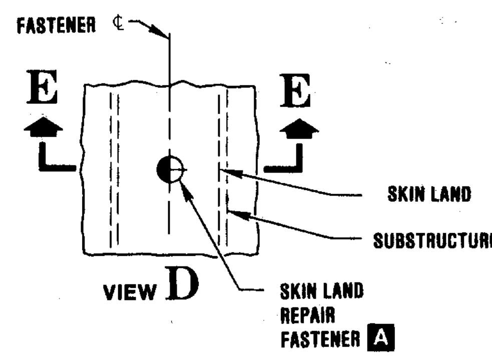
ALL RIVETING MUST BE ACCOMPLISHED WHILE EPOXY IS IN PLASTIC STATE. RIVETING A CURED REPAIR WILL DESTROY BOND.



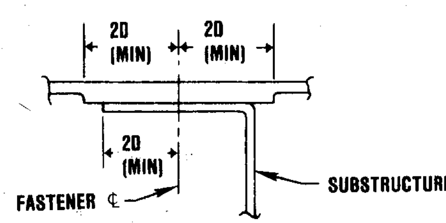
NOTES

THIS ILLUSTRATION PROVIDES SPECIAL INSTRUCTIONS NECESSARY FOR DEVELOPING SHEAR OR TENSION REPAIRS ACROSS A CHEM-MILLED SKIN LAND AND SUBSTRUCTURE.

- REFER TO "BASIC FASTENER CALCULATIONS", 51-20-20, FOR GENERAL DATA RELATIVE TO FASTENER REQUIREMENTS.
- REFER TO "GENERAL REPAIR REQUIREMENTS", 51-20-20, FOR FASTENER SPACING TRIM RADII, AND RELATED DATA.
- A SHEAR REPAIR IS USED AS AN EXAMPLE. A TENSION REPAIR WOULD BE IDENTICAL TO REPAIR SHOWN EXCEPT THAT FASTENER CALCULATIONS WOULD BE FOR TENSION VALUES ON TENSION SIDES OF REPAIR.
- SKIN LAND OVER FRAMES, LONGERONS, STIFFENERS, OR RIBS CARRY TENSION LOADS REGARDLESS OF PRIMARY LOAD IN THE PANEL. REPAIRS TO SKIN LANDS MUST DEVELOP FULL TENSION CAPABILITIES OF LANDS.
- REPAIR DOUBLER MATERIAL AND CONDITION IS SAME AS DAMAGED SKIN.
- AREA OF REPAIR DOUBLER TAB MUST EQUAL AREA OF DAMAGED SKIN LAND.
- THICKNESS OF REPAIR DOUBLER IS DETERMINED BY REQUIREMENTS FOR REPAIR OF SKIN LAND. THAT IS, SELECTED SKIN LAND REPAIR FASTENER MUST HAVE A JOINT ALLOWABLE IN REPAIR DOUBLER EQUAL TO, OR GREATER THAN, ALLOWABLE IN SKIN LAND. USE PROTRUDING-HEAD FASTENER ALLOWABLES FOR DETERMINING STRENGTH OF JOINTS IN REPAIR DOUBLER



VIEW D



SECTION E-E

A **Dia of skin land repair fastener selected must meet requirements shown in section E-E.**

S265-3-321

Chem-milled Skin Repair Across A Skin Land — Nonpressurized
Figure 204 (Sheet 2 of 2)

GENERAL REPAIR

REPAIR

GENERAL

General repairs differ from typical repairs in that instructions are complete on repair illustrations, except for references to procedures.

SECONDARY STRUCTURE REPAIRS

Secondary structure repairs (figure 201) are applicable to secondary structure as indicated in figure 1, 51-70-00.

NEGLIGIBLE HOLE REPAIRS

Negligible hole repairs (figure 202) are primarily aerodynamic "plugs" and may be used to fill holes defined as structurally negligible in negligible damage instructions for each component.

HONEYCOMB TRAINING EDGE REPAIRS

NOTE

Repairs are not permitted to elevators with honeycomb trailing edges.

For bonding procedures and materials, refer to 51-20-20.

Minor damage to surface trailing edges, EXCEPT ELEVATORS, may be repaired by filling damaged honeycomb area with a lightweight epoxy (Corefil 615), as shown in figure 203.

To repair damage exceeding limits given in figure 203, see figure 204 and proceed as follows:

1. Lay out trim lines, and bond overlap boundaries.
2. Strip finish from area to be bonded, and clean thoroughly before trimming out damaged material, to avoid contaminating core at bond line. Trim out damaged area.
3. Shape balsa wood filler to closely match removed trailing edge section. Side and forward edges should form a tight fit with the cutout.
4. Protect balsa wood from all forms of foreign matter after filling.
5. Form repair doubler to fit snugly over trailing edge and filler. Clamp repair in place, and drill all rivet holes. Remove repair doubler, and countersink all holes.
6. Perform final cleaning operations on trailing edge.
7. Prepare adhesive, and bond all parts in place. Install rivets while adhesive is wet. Fill hollow rivets with adhesive after pulling.
8. Clean any adhesive from surface of repair doubler and lightly clamp entire repair to ensure complete contact of all faying surfaces.
9. Clean all excess adhesive from around repair.
10. Cure repair for 4 hours at 150° F or 8 hours at 70°F before removing clamps. Remove clamps and carefully scrape off any extruded adhesive.
11. Refinish repair to match surrounding area.
12. Check balanced control surfaces after repair, and rebalance as necessary. (Refer to applicable component chapter.)

GLASS-FABRIC-REINFORCED PLASTIC REPAIRS

1. General
   Glass-fabric-reinforced plastic parts are used for radio and radar antenna covers and various shields and covers for electrical equipment. Many of these parts are small and should be replaced if damaged. Larger parts may be repaired if necessary, provided damage is not too great and is not in a critical area.

   Damage usually consists of tears, bruised or delaminated areas, or a combination of these damages. Most common type of damage is skin fracture or tears. When cuts or tears extend through several layers of skin in locations where appearance is not important, damage may be repaired by bonding a patch to exterior surface of part. This type of repair may be used on some of glass-fabric-reinforced-plastic electrical covers, etc, but should not be used on antenna covers. Repairs shown in figure 205 may be used on all laminated glass-fabric parts on airplane.

   When damage occurs to radome or antenna covers in area of radio or radar transmission, repair personnel must take extra care to maintain exact design thickness and contour of original installation. A natural tendency to "beef up" repair area must be avoided. An antenna cover admits a particular frequency range of electromagnetic spectrum at a particular angle or ray incidence; therefore, any changes in thickness on cover, in this area, may cause distortion of electrical waves. Laminated plastic parts may become bruised or delaminated beneath surface if subjected to a sharp blow. Damage of this type, which is not over a large area, can often be repaired by injecting a small quantity of resin

REPAIR (Continued)

GLASS-FABRIC-REINFORCED PLASTIC REPAIRS (Cont'd)

through skin with a hypodermic syringe. If damaged area is too large to be filled with a hypodermic syringe, a series of No. 60 holes, evenly spaced through area of damage, may be drilled. Enough resin to ensure bonding of all separated surfaces is then injected through holes. Entire area must be placed under enough pressure to remove excess resin. After curing, sand and refinish area. Delamination may be visible on surface of part as a bubble or blister. In some cases subsurface delamination may not be visible. If delamination is suspected, but cannot be seen, extent of damage may be determined by tapping surface with a coin or small tool. Undamaged areas will respond with a sharp metallic ring, whereas delaminated areas will produce a hollow sound. Tapping procedure is not satisfactory for surfaces coated with rain-erosion protective material because coating dulls sound of coin or tool.

2. Materials Required

MATERIAL	SOURCE KEY [A]
Glass fabric, 181 style	048
Resin, low-pressure laminating (conforming to Spec MIL-R-7575)	047
Catalyst (liquid), methyl ethyl ketone peroxide	001
Cobolt naphthenate (6%)	046
Cellophane	001
Polyvinyl alcohol sheet (0.003 - to 0.005 in.)	001

3. Equipment Required
Following equipment is suggested to aid in making this repair. Substitute equipment may be used as needed.

EQUIPMENT	SOURCE
Razor blades (single-edge)	Source of all items is commercial.
Infrared heat lamp (250-watt, 105-to-120 volt or equivalent)	
Small spatula	
Paint brush (1/2- or one in. width)	
Rolling pin or equivalent	

[A] Refer to table 2, 51-30-00 for manufacturer.

4. Preparation of Damaged Area — Stepped Method
Clean out damage to a rectangular shape large enough to remove any areas that have delaminated. Rectangular shape makes it easier to fit repair layers of glass cloth. A sharp knife or razor blade may be used to cut material. After hole has been sized, correct amount of overlap for top layer may be determined. (See figure 205, sheet 1). Carefully trim and peel top layer of cloth from overlap area. Be careful not to cut into next layer of cloth, and do not let layers separate outside damaged area. This would result in an area that is structurally weaker than surrounding area. Cut and peel each layer in stair-step fashion as shown in figure 205, sheet 1. A spatula is often helpful in lifting layers and for separating layers for removal.

5. Preparation of Damaged Area — Tapered Method
See figure 205, sheet 2.

6. Mixing of Laminate Resin
Laminating resin must be mixed with curing agent or catalyst according to manufacturer's instructions before use. After adding curing agent to resin, mix thoroughly for several minutes. Laminating resin should be mixed in small amounts to minimize waste. Mixed resin has a pot life of only about 6 hours.

7. Preparing Wet Layer
Spread glass fabric on a sheet of cellophane on a flat surface. Saturate fabric with mixed resin, spreading it uniformly over surface with a spatula or other flat tool. Cover saturated fabric with another sheet of cellophane, and roll gently but firmly to force resin into fabric. This rolling action forces the excess resin out to edge of fabric. This impregnated fabric between sheets of cellophane may then be cut to required size. To avoid contamination, cellophane should remain in contact with "wet" fabric until layer is to be used.

8. Preparing Dry Layer
"Dry" or precured layer is used as a backing layer in stepped repair. This layer is contoured to match part being repaired as near as possible. Preparation is same as for a "wet" layer, except that it is not cut to size until after it is cured. To cure "dry" layer, lay fabric smoothly over a contouring block and expose it to heat from an infrared heat lamp or equivalent for one hour. Lamp should be held about 12 to 15 inches from surface of layer. Surface temperature should be 150°F to 200°F for at least one hour. After layer has cooled, it should be relatively hard if it is completely cured. Do not remove cellophane sheets.

REPAIR (Continued)

GLASS-FABRIC-REINFORCED PLASTIC REPAIRS (Cont'd)

9. Rebuilding Damaged Area—Stepped Method
When glass fabric has been damaged to extent that all of fabric laminates have been penetrated, use a backup layer or plate to make repair. If area to be repaired is contoured, make a dry backing layer to match damaged part. If damaged area is flat, a piece of sheet metal will work equally well as a prepared dry layer. Backup plate is used to support repair layers as they are placed in position. Place a layer of cellophane between backup plate and damaged surface, and tape backup plate in place. Cellophane sheet should be large enough to prevent leakage of laminating resin onto adjacent areas of panel. Masking off cutout area to be rebuilt with either cellophane or masking tape, covering an area at least 2 in. wide around entire cutout. Masking saves considerable time and trouble in cleanup process after repair has cured. Peel cellophane from one side of first wet layer, and place in position with cellophane-covered side up. Rub cellophane gently, and work any excess resin and trapped air bubbles to edges. Remove remaining layer of cellophane, and repeat procedure for all layers until repaired area has same number of layers as original part.

   When last layer is in place, remove outer cellophane from it and brush a thin coat of resin over outside layer. Cover repair area with a sheet of polyvinyl alcohol sheet. Stretch this sheet as tightly as possible, without wrinkles, and secure it with cellophane or masking tape. Rub repair area gently with a smooth tool to remove excess resin and to work any air bubbles out of layers and onto masking. Avoid excessive rubbing because it may reduce resin content of fabric enough so that a poor bond results.

10. Rebuilding Damaged Method — Tapered Method
See figure 205, sheet 2.

BATTS REPAIR

This repair is for fiberglass batts made of Orcon AN-4B or equivalent (metallic type material).

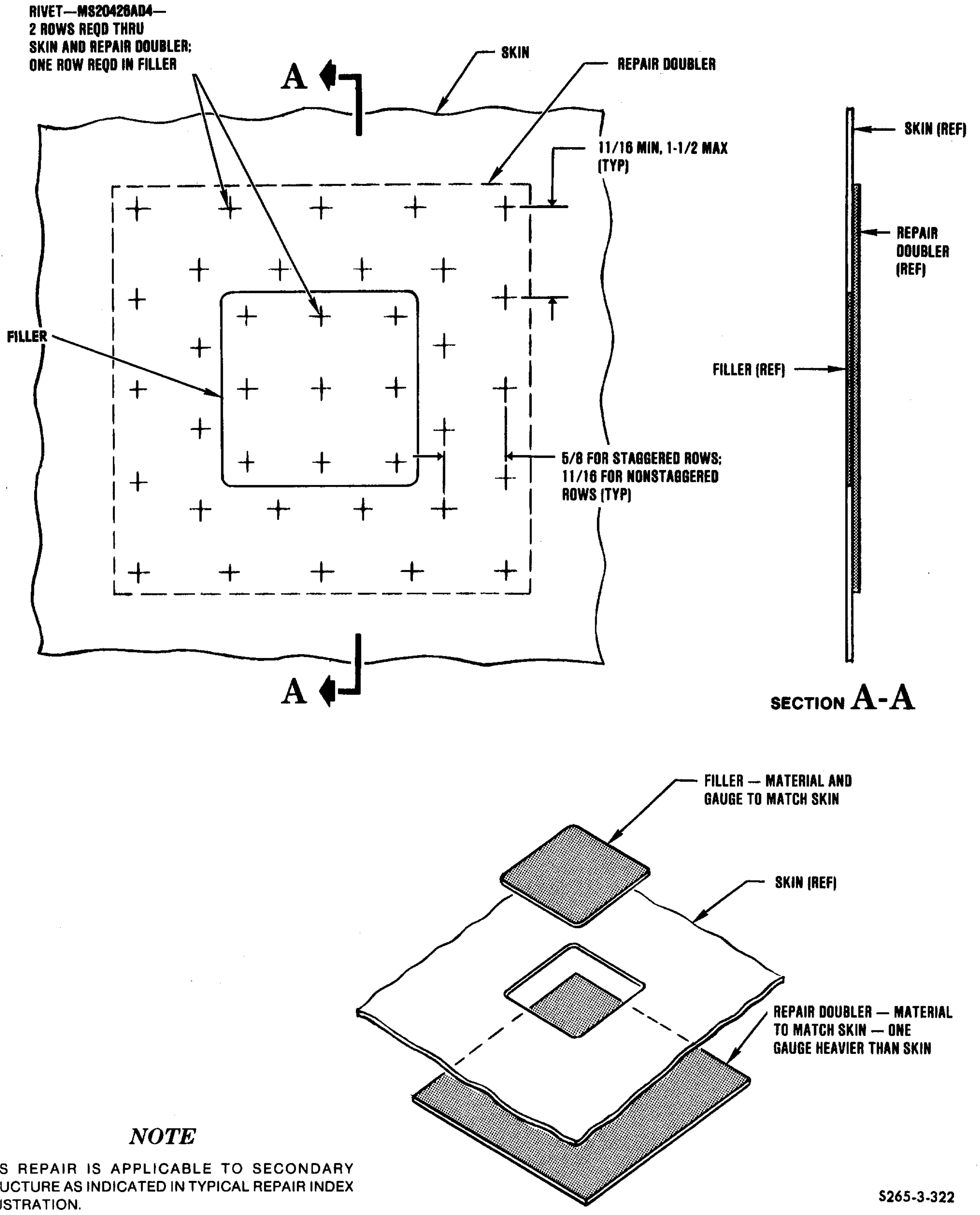
CONSUMABLES

MATERIALS	SOURCE KEY **A**
ORCOTAPE, OT-6	059
ORCOTAPE, OT-7	059
ORCOTAPE, OT-22	059

A Refer to 51-30-00 table 2 for manufacturer.

BATTS REPAIR PROCEDURES

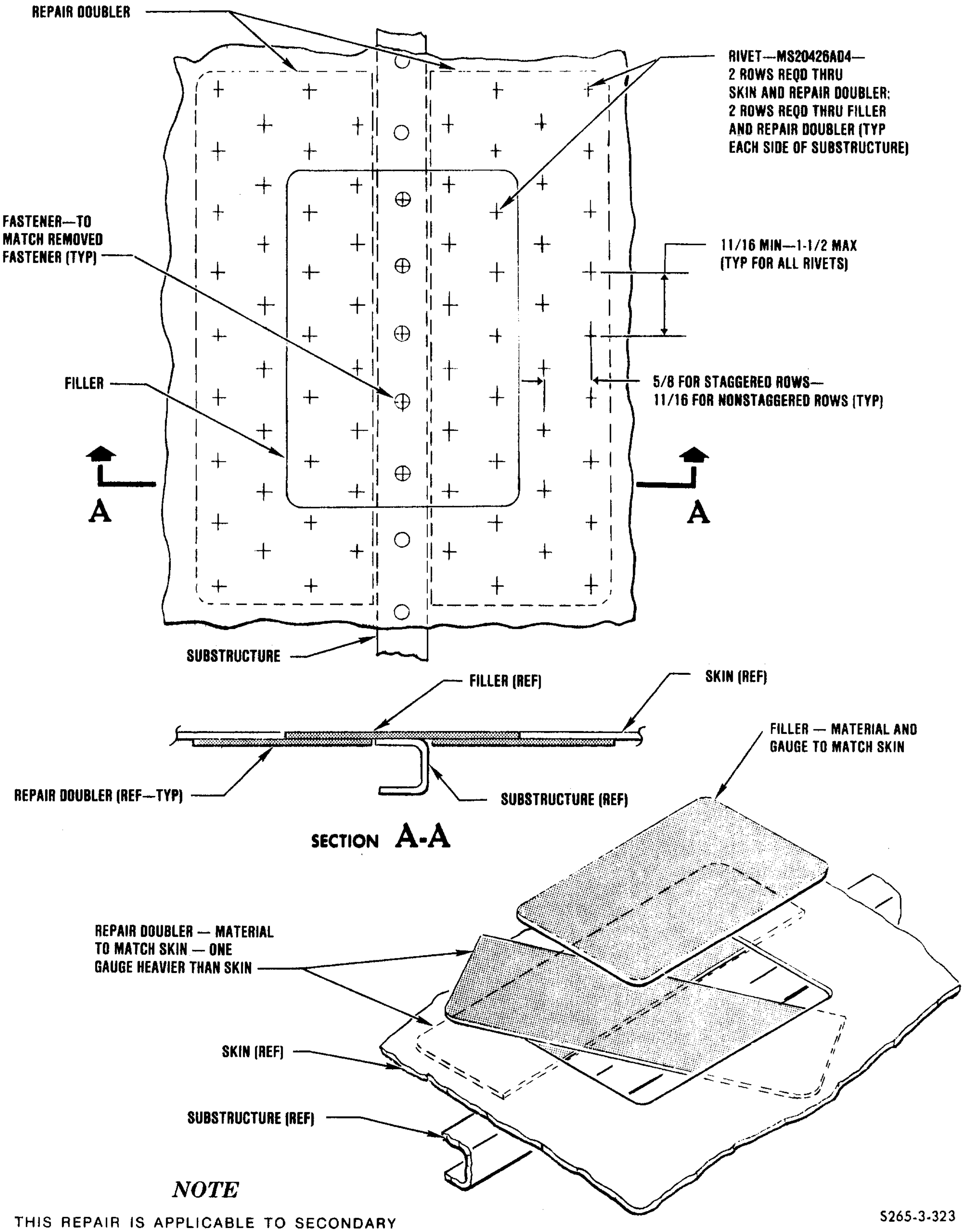
1. Interior of batt and batting material must be dry and free of moisture. If batt is not completely dry, replace.
2. Apply repair tape per the following:
   A. For continuous, long lasting adhesion the surface to which an Orcotape reinforced, light weight, pressure sensitive tape is applied must be clean and dry. Surfaces should be wiped with a clean, lint free cloth. When dust may be present, the surface should also be wiped with a tack cloth. (see Figure 206)
   B. Orcotape may be repositioned a short time after application. If repositioning is necessary, lift the tape by peeling at 180 degrees.
   C. After Orcotape has been correctly positioned, uniform and firm pressure should be exerted over the tape to assure complete contact.
   D. If necessary the surfaces of Orcotape OT-6 and OT-7 may be cleaned with any cleaner or solvent which does not harm the surface which either tape is applied.
3. Reinstall batt to airplane structure using Orcotape OT-22.



NOTE

THIS REPAIR IS APPLICABLE TO SECONDARY STRUCTURE AS INDICATED IN TYPICAL REPAIR INDEX ILLUSTRATION.

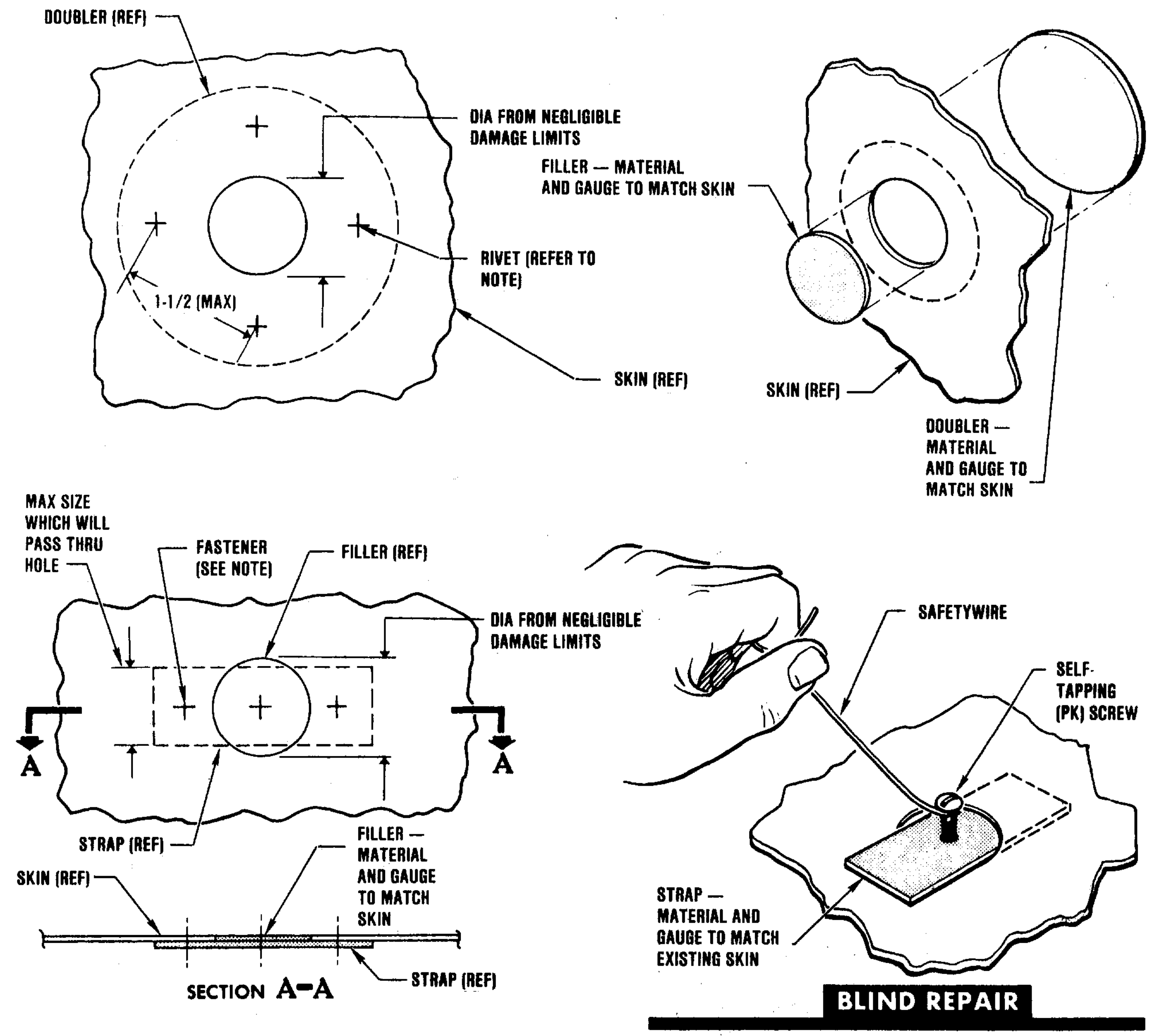
Secondary Structure Repair
Figure 201 (Sheet 1 of 2)



NOTE

THIS REPAIR IS APPLICABLE TO SECONDARY STRUCTURE AS INDICATED IN TYPICAL REPAIR INDEX ILLUSTRATION.

Secondary Structure Repair
Figure 201 (Sheet 2 of 2)



NOTES

- REPAIRS SHOWN ARE TO BE USED ONLY AS PLUGS IN STRUCTURALLY NEGLIGIBLE HOLES AS DEFINED IN NEGLIGIBLE DAMAGE LIMITS FOR EACH STRUCTURAL COMPONENT.
- MATERIALS LESS THAN 0.040 IN. THICK SHOULD BE DIMPLED WHEN ACCESS AND TOOLING PERMIT. WHEN DIMPLING IS NOT PRACTICAL, USE COUNTERSINK DATA SHOWN.
- FOR FLUSHNESS, USE AERODYNAMIC FILLER WHEN REQUIRED.
- WHEN APPLICABLE, SEAL WITH SEALANT APPROPRIATE TO REPAIRED AREA.
- THE CIRCULAR REPAIR DOUBLER MAY BE INSTALLED EXTERNALLY AS A TEMPORARY REPAIR. RIVETS SHOULD BE FLUSHED AND EDGES OF PATCH CHAMFERED.

COUNTERSINK CHART

MATERIAL THICKNESS (IN.)	RIVET			
	SOLID SHANK		BLIND	
	NAS1097	MS20426	PULL	EXPLOSIVE
0.020	AD3	AD2	CR116-3 A	
0.025	AD3	AD2	CR116-3 A	
0.032	AD3	AD3	CR116-3	MS20603-4 A
0.040 and Heavier	AD4	AD4	MS20601-4	MS20603-4

NOTE

A COUNTERSINK TO DEPTH OF MATERIAL THICKNESS, AND MILL PROTRUDING PORTION OF RIVET HEAD AFTER DRIVING.

S265-3-324

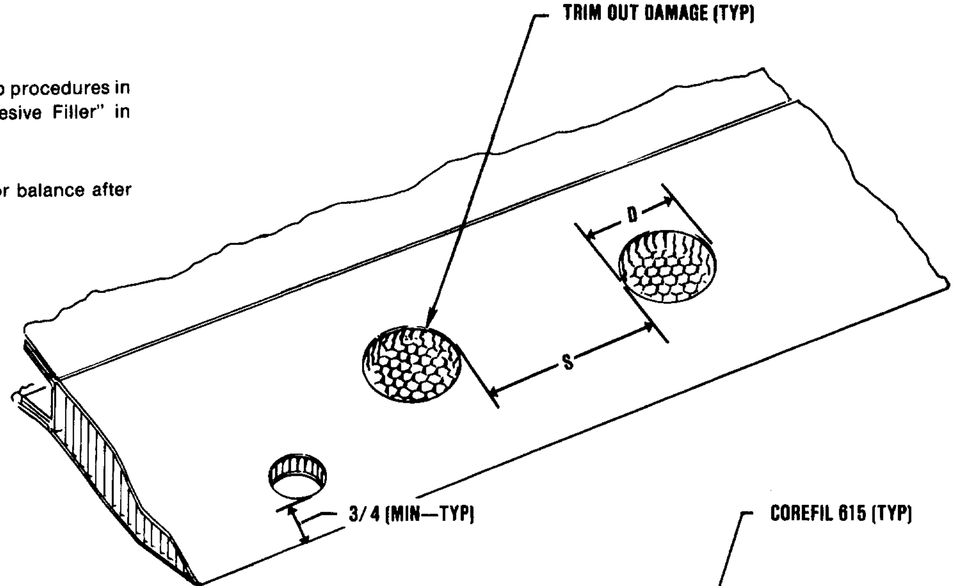
Negligible Hole Repair
Figure 202

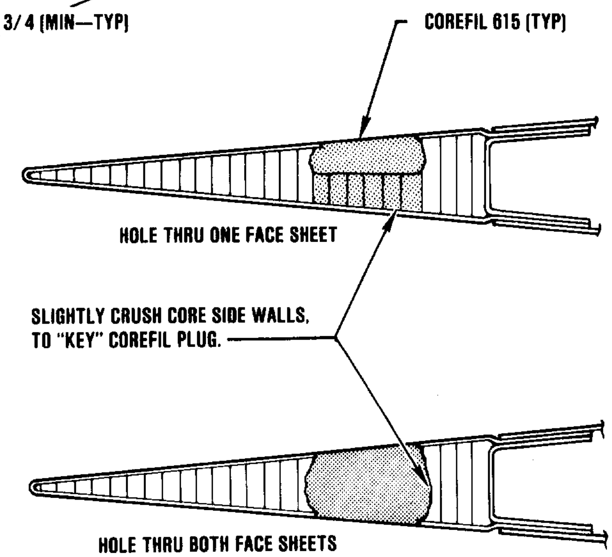
1 Trim out damage, and round edges of hole. Remove minimum of material.

2 Crush core side walls as shown.

3 Prepare filler, and fill hole according to procedures in "Repairing Honeycomb Panels With Adhesive Filler" in 51-20-20.

4 Balance surfaces must be checked for balance after repair.





REPARABLE LIMITS	
d—HOLE DIA (IN.)	S—DISTANCE IN INCHES BETWEEN HOLES
1/2 TO 3/4	3 (MIN)
3/4 TO 1-1/2 (MAX)	5 (MIN)

NOTES

- ***This is a nonstructural repair. It is applicable to all trailing edges except as follows.***
- ***Repairs not allowed to honeycomb elevator trailing edges (must replace).***
- ***On NA 265-40, -60, -70, and -80 airplanes, nonstructural repairs must not be made in shaded area between flap station 106.774 and 123.840. Nonstructural repairs can be made aft of shaded area if holes do not exceed 3/4 in. diameter.***

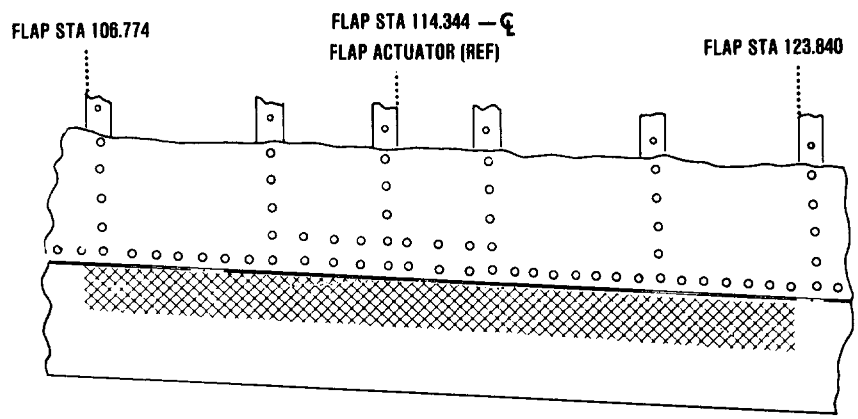
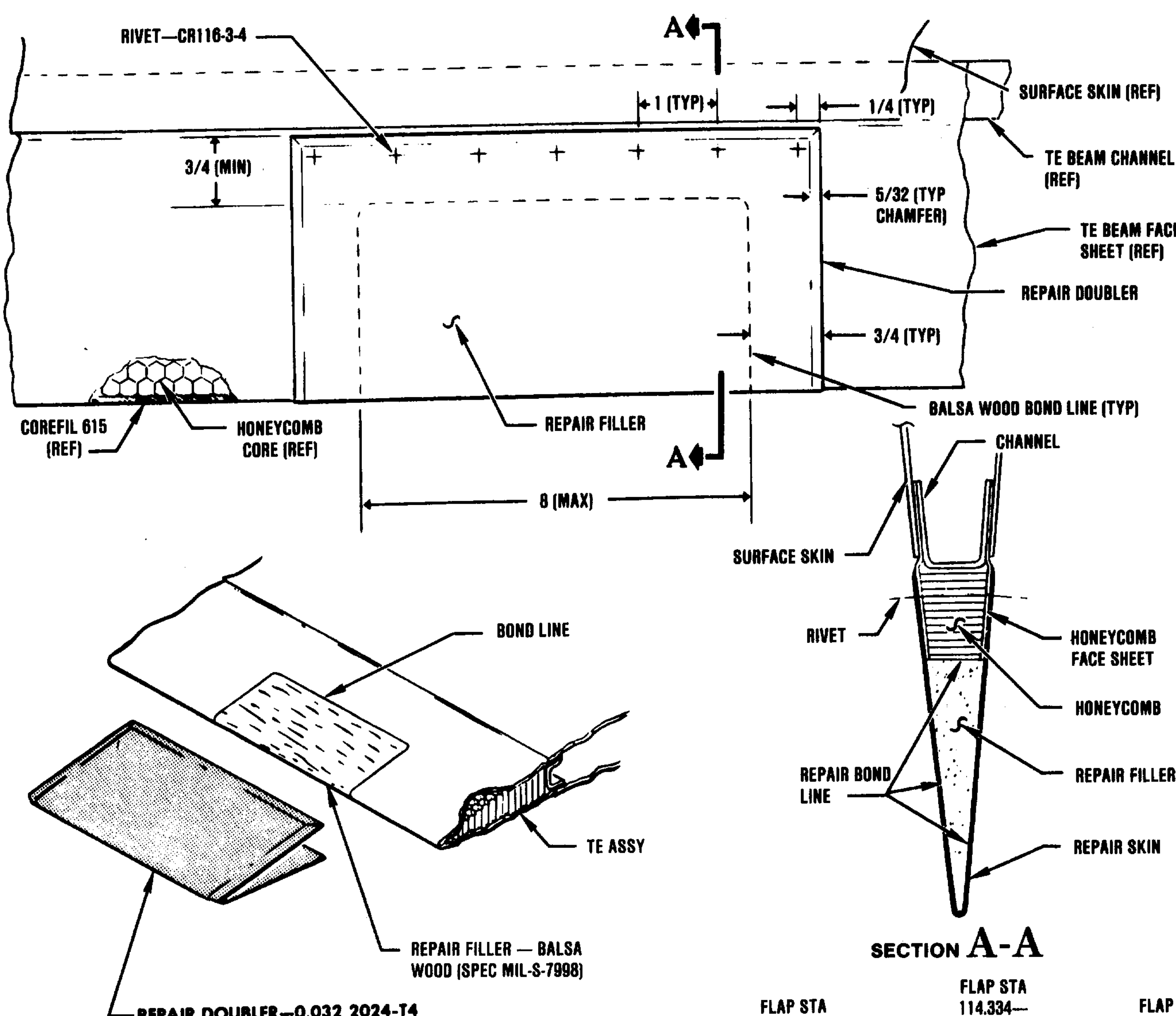
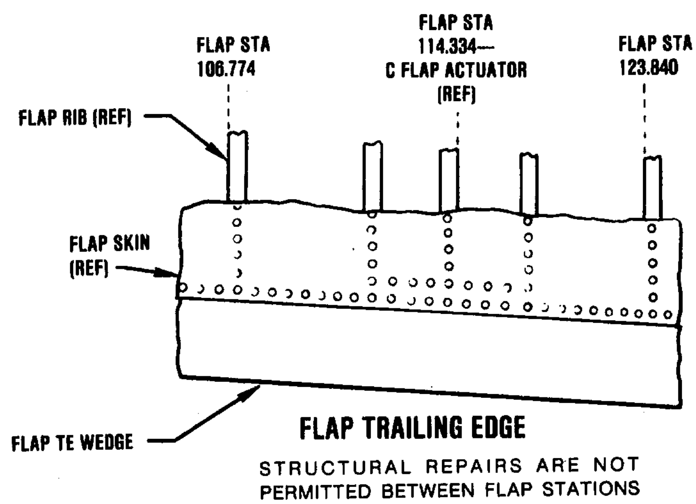


Figure 203 — Honeycomb Trailing Edge Small Hole Repair



NOTES

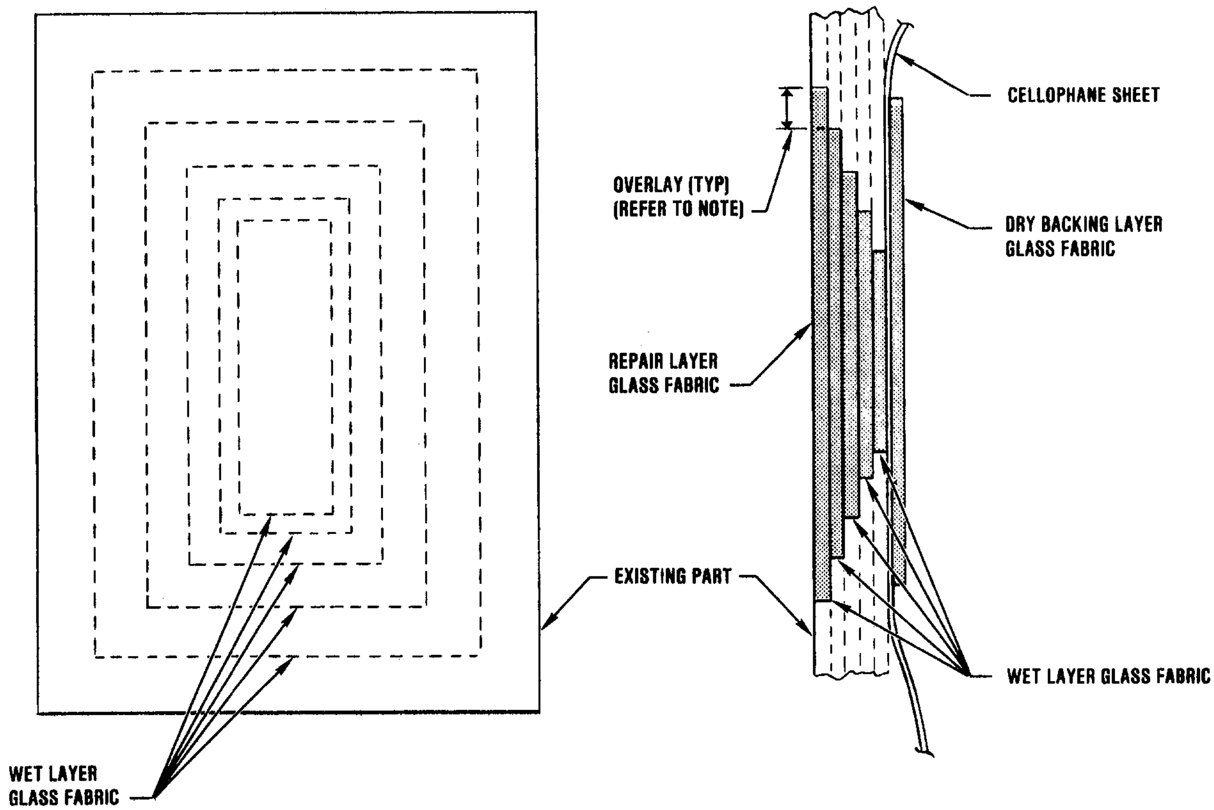
- *This repair is applicable to all bonded aluminum honeycomb trailing edges, except elevators, and as noted in the flap trailing edge view.*
- *There must be 6 in. of undamaged trailing edge between repairs.*
- *Refer to "Repairing Honeycomb Trailing Edges" for additional repair instructions.*
- *Balance surfaces must be checked for balance after repair.*
- *Dimensions shown are in in.*



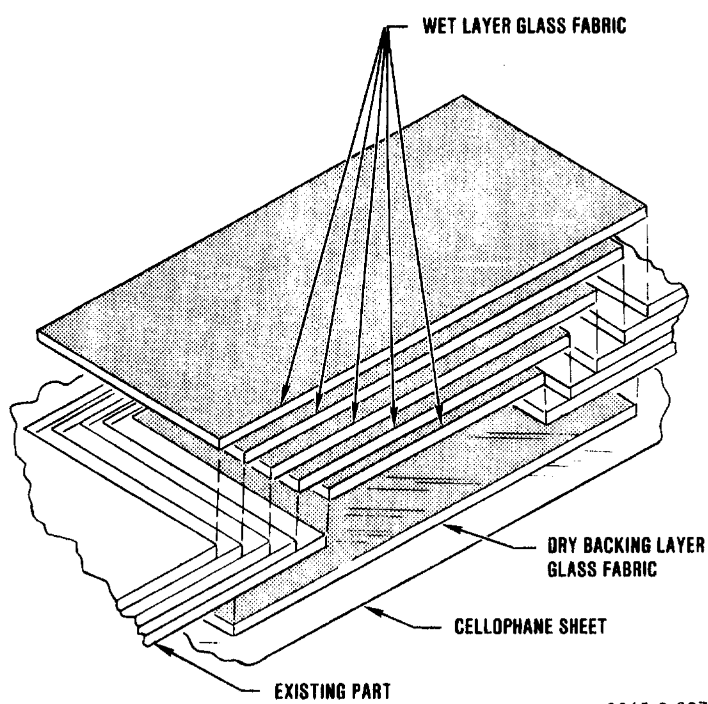
S265-3-326

Figure 204 — Honeycomb Trailing Edge Repair

STEPPED REPAIR



1. Trim out damaged area in "stair-step" fashion, as shown. Do not cut into layer below the one being removed.
2. Mix resin and prepare layers.
3. Install dry layer as shown.
4. Install wet layers.
5. Cover repair with polyvinyl alcohol sheet. Stretch it until it is as tight as possible, and tape it in place.
6. Cure, repair, and refinish area.



NOTES

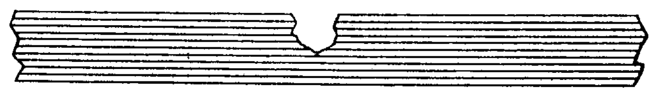
- HOLES NOT EXCEEDING 2-1/2 BY 4 IN. REQUIRE 1/2 IN. OVERLAP; HOLES EXCEEDING 2-1/2 BY 4 IN., BUT NOT EXCEEDING 5 BY 8 IN., REQUIRE 3/4 IN. OVERLAP; HOLES EXCEEDING 5 BY 8 IN. REQUIRE ONE IN. OVERLAP.
- REFER TO "GLASS-FABRIC-REINFORCED PLASTIC REPAIRS" TEXT.

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Glass-fabric-reinforced Plastic Repair
Figure 205 (Sheet 1 of 2)

TAPERED REPAIR

PARTIAL PENETRATION



1 Clean out damage to a rounded or circular-shaped opening.

- Chamfer area around cleaned-up damage to approximately 30° from first laminate.
- On side opposite chamfer, carefully remove a rectangular piece from first laminate of glass cloth, same length as diameter of chamfered area.



2 Grind chamfered area to an approximately spherical shape. This will ensure that glass-fabric repair laminates are in proper position.

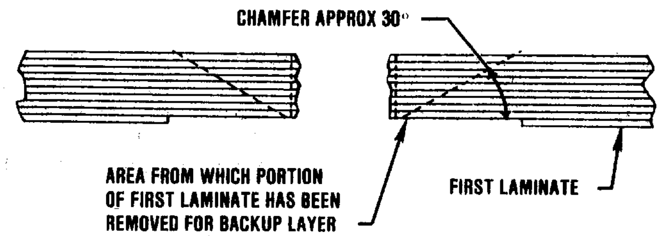
- Replace removed portion of first laminate with a backup layer of glass cloth saturated with laminating resin.
- Before attempting to install any repair laminates, allow backup layer to cure.

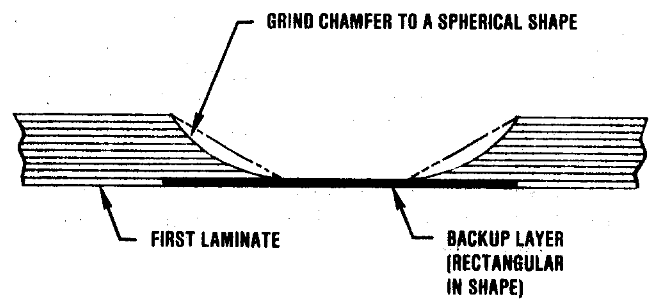


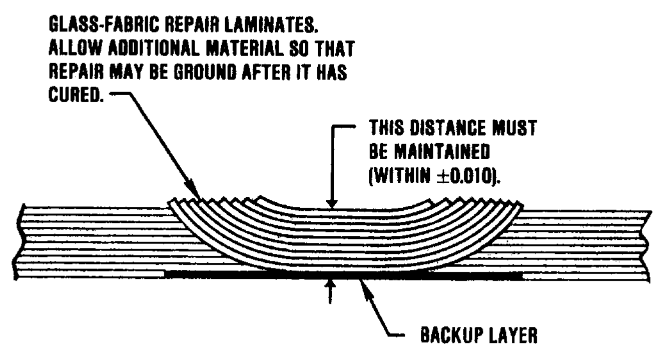
3 Restore damaged area to its original thickness by filling spherical void with layers of glass-fabric repair laminates saturated with laminating resin.

- Allow repair to completely cure.

COMPLETE PENETRATION





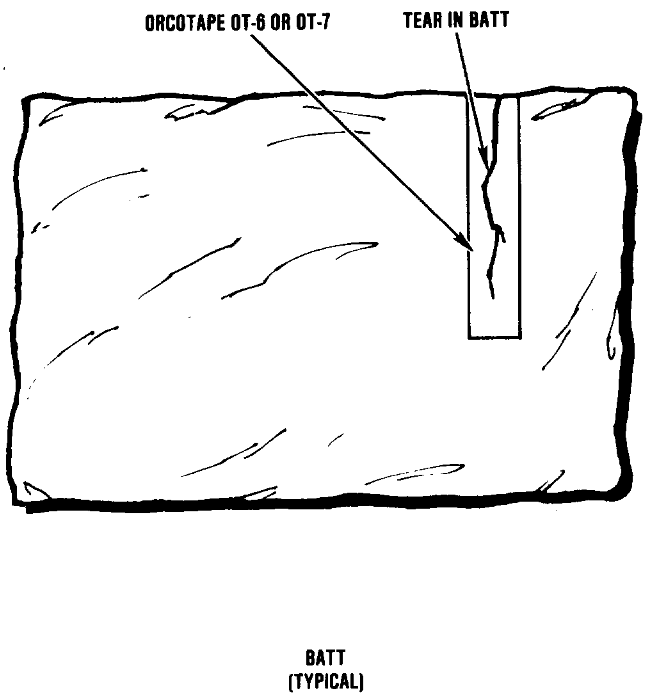


NOTE

IN RADOME REPAIRS, THICKNESS OF COMPLETED REPAIR MUST BE WITHIN 0.010 IN. OF THICKNESS OF RADOME BEFORE IT WAS DAMAGED. FOR ADDITIONAL INFORMATION REFER TO TEXT IN THIS SECTION.

S265-3-328

Glass-fabric-reinforced Plastic Repair
Figure 205 (Sheet 2 of 2)



1. Make sure batt interior is completely dry.
2. Clean surface of batt with clean lint free cloth.
3. Apply Orcotape OT-6 or OT-7 over tear.
4. Reinstall batt in airplane using Orcotape OT-22 double-faced tape.

Figure 206 — BATTS Repair

RESTRICTED-LIFE REPAIRS

REPAIR

GENERAL

Restricted-life repairs are to be used only for purpose of preparing a damaged structure for a flight (restricted) to a facility where permanent repairs can be effected. When a flight is to be made with restricted-life repairs incorporated, place a suitable placard in cockpit stating flight limitations. (Refer to 51-00-10.)

CONVERTING CLASS A AND CLASS B REPAIRS TO RESTRICTED LIFE REPAIRS

Class A and Class B repairs shown in each repair chapter may be used as guides in design of restricted-life repairs. Skin repair doublers shown inside skin may be installed outside skin. Protruding-head fasteners may be used in place of flush-head fasteners called out. "Restricted-life Repair Fastener Substitution Table" lists blind, protruding-head fasteners that may be substituted size-for-size for fasteners called out in repairs or used in original construction.

Repairs to fuel-carrying areas of wing must be fuel tight. Finish requirements need not be complied with in any area of airplane.

Table 201. Restricted-Life Repair Fastener Substitution

SUBSTITUTE PROTRUDING HEAD BLIND FASTENER	ORIGINAL CONSTRUCTION OR REPAIR CALL-OUT FASTENER (FLUSH)						
	AL ALY RIVETS						
	AD	AD	MONEL RIVETS	CRES RIVETS	HI-SHEAR RIVETS	JO-BOLTS	BOLTS AND SCREWS **A**
MS20600AD	X						
MS20600MM	X						
CR6634	X	X	X	X			
Al Aly Cherrylock rivets	X						
Monel Cherrylock rivets	X	X	X	X			
CRES Cherrylock rivets	X	X	X	X			
2249 Cherrylock rivets	X	X	X	X			
MS20602AD **B**	X						
P Series Jo-bolts		X	X	X	X	X	X
6951-S Deutsch drive pins					X	X	X

NOTES

A SUBSTITUTION PERMITTED FOR SHEET-METAL ATTACHMENT ONLY. DO NOT USE FOR ATTACHMENT FITTINGS.

B DO NOT USE EXPLOSIVE RIVETS IN FUEL AREAS.

NEGLIGIBLE DAMAGE REWORK

STRUCTURAL IDENTIFICAITON

GENERAL

Refer to 51-10-00, "Damage Classificaiton," for definition of dents, scratches and nicks, negligible corrosion, cracks, and holes.

NEGLIGIBLE DAMAGE REWORK

REPAIR

GENERAL

Although certain types of damage may be considered structurally negligible, in most cases, rework must be performed to prevent negligible damage from developing into major damage. With specific limits, the following are classified as negligible damage: dents, scratches, nicks, corrosion, cracks, and holes. Limitations are shown on the negligible damage illustrations in each structural group chapter.

DENTS

Minor dents may be left "as is" or filled with aerodynamic skin filler. Larger dents should be bumped out to mold line. No sharp dents or wrinkles are permitted.

SCRATCHES AND NICKS

Scratches or nicks are not considered negligible until after they have been reworked by blending or other prescribed methods. Scratches or nicks may reduce the cross-sectional area of a material and produce localized stress concentration. This condition can lead to fatigue cracks and possible failure of component.

Blending of scratches or nicks is process of smoothing out damage area. To blend properly, a fine-grit (400 or finer) abrasive cloth or paper, or aluminum wool, should be used. Do not use crocus cloth or steel wool, since they tend to cause corrosion. Scratches or nicks should be smoothed out with abrasive to remove all damage. Reworked area must be kept as small as possible and with minimum of material removed at bottom of damage.

In certain highly stressed areas, it is necessary to use a dye-penetrant check after blending to reveal any cracks which may otherwise be undetected.

After blending, damaged area must be chemical-film-treated and primed. (Refer to Sabreliner Corrosion Control Manual, SR-76-023.)

NEGLIGIBLE CORROSION DAMAGE

If corrosion damage does not exceed the prescribed limits for scratches and nicks, clean out corrosion and chemical-film-treat and prime area. (Refer to Sabreliner Corrosion Control Manual, SR-76-023.)

CRACKS

Stop-drill negligible cracks at each end.

HOLES

Plug all structurally negligible holes in skins for both weather sealing and aerodynamic reasons.

CHAPTER

52

DOORS

CHAPTER 52

DOORS

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DOORS

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LIST OF EFFECTIVE PAGES

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER 52

DOORS

STRUCTURAL IDENTIFICATION

GENERAL

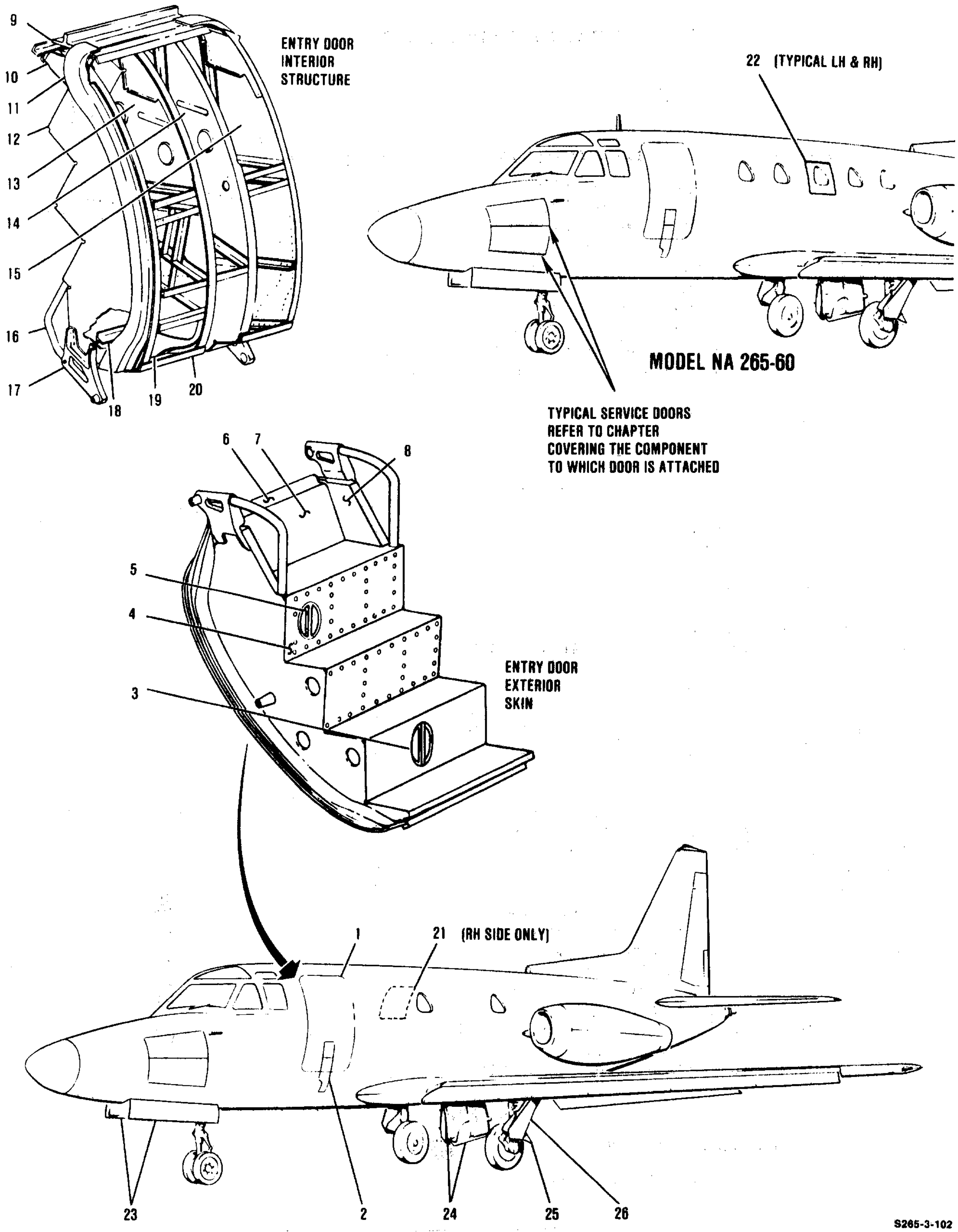
This chapter contains repairs, negligible damage limits, and fitting of airframe doors.

DOOR REPAIR INDEX

See figure 1 for Model NA 265-40, -60, -60A, -60SC, -65, and -70 (S/N 370-2 thru -6, -8, and -9). See figure 2 for Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC.

SKIN GAP DIAGRAM

See figure 3.



Door Repair Index — Model NA 265-40, -60, -60A, -60SC, -65, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 1

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE	REPAIR FIGURE NO. [A]
	265-300021	Fuselage Entrance Door			
1	265-300238	Skin — Fuselage Entrance Door	2024-T3 Bare	0.050 [B]	53-30-20 Fig. 202
2	265-300209	Cover — Center Link, Fuselage Entrance Door	7075-T6 Bare	0.125 [B]	
3	265-300242	Handle — Inside, Fuselage Entrance Door	50-T6 Alloy Cast.		
4	265-300023-5	Stair Tread (Rigidized Sheet No. 5WL)	2024-T3 Bare	0.040	
5	265-300023-43	Handle — Fuselage Entrance Door	6061-0 Tube	0.049	
6	265-300023-89	Cover — Stair Tread	2024-T42 Bare	0.040	
7	265-300023-3	Stair Tread (Rigidized Sheet No. 5WL)	2024-T3 Bare	0.040	
8	265-300023-63	Web	7178-T6 Bare	0.040	
9	265-300023-25	Door Beam	7178-T6 Extr	6E1006	
10	265-300023-27	Door Angle	7178-T6 Extr	78J	
11	265-300239	Door Land — Forward	Glass Fabric	0.010	
	265-300240	Door Land — Aft	Glass Fabric	0.010	
12	265-300234	Frame — Entrance Door, FS 146.187			
	265-300234-25	Angle	7178-T6 Extr	1E698	
	265-300234-27	Doubler	7178-T6 Bare	0.025	
	265-300234-29	Frame	7075-T6 Bare	0.032	
13	265-300234	Frame — Entrance Door, FS 155.25			
	265-300234-3	Frame	7178-T6 Bare	0.032	
	265-300234-7	Angle	7178-T6 Extr	1E698	
	265-300234-31	Doubler	7178-T6 Bare	0.025	
14	265-300236	Frame — Entrance Door, FS 161.75			
	265-300236-3	Frame	7178-T6 Bare	0.032	
	265-300236-7	Angle	7178-T6 Extr	1E698	
	265-300236-19	Doubler	7178-T6 Bare	0.025	
15	265-300237	Frame — Entrance Door, FS 170.187			
	265-300237-3	Frame	7178-T6 Bare	0.032	
	265-300237-5	Angle	7178-T6 Extr	1E698	
	265-300237-15	Doubler	7178-T6 Bare	0.025	
16	265-300241	Handrail — Entrance Door	6061-0 Tube	0.049	
17	265-300216	Fitting — Attaching Arm Support	7178-T6 Bare	2.250	
18	265-300023-29	Beam	7178-T6 Bare	6E1102	
19	265-300023-45	Doubler	7178-T6 Bare	0.080	
20	265-300023-9	Sheet	7178-T6 Bare	0.050	
21	265-300025	Door — Ground Escape Hatch (S/N 282-1 Thru -90)	2024-T3 Bare	0.050 [B]	53-30-20 Fig. 202
	282-300027-101	Door — Ground Escape Hatch (S/N 282-91 and Later)	2024-T3 Bare	0.050 [B]	53-30-20 Fig. 202
22	282-300027-101	Door — Ground Escape Hatch, LH (S/N 306-1 and Later)	2024-T3 Bare	0.050 [B]	53-30-20 Fig. 202
	282-300027-102	Door — Ground Escape Hatch, RH (S/N 306-1 and Later)	2024-T3 Bare	0.050 [B]	53-30-20 Fig. 202
23	265-34301-3	Door — Nose Landing Gear, LH	2024-T42 Clad	0.032	Fig. 202, 203

NOTES

- ***For additional repairs, refer to 51-70-00.***

[A] ***Figure number is in this chapter unless otherwise noted.***

[B] ***This is a chem-milled or machined part. Measure thinned areas, or refer to drawing numbers for thickness variation.***

S265-3-102

Key to Figure 1
(Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE	REPAIR FIGURE NO. A
23	265-34301-4	Door — Nose Landing Gear, RH	2024-T42 Clad	0.032	Fig. 202, 203
24	265-333301-3	Door — Main Landing Gear, LH	7075-T6 Clad	0.032	Fig. 202, 203
	265-333301-4	Door — Main Landing Gear, RH	7075-T6 Clad	0.032	Fig. 202, 203
25	265-333371-1	Door — Fixed, Main Landing Gear, LH	2024-T42 Bare	0.625 B	
	265-333371-2	Door — Fixed, Main Landing Gear, RH	2024-T42 Bare	0.625 B	
26	265-333351-7	Door — Movable, Main Landing Gear, LH	2024-T42 Bare	1.000 B	
	265-333351-8	Door — Movable, Main Landing Gear, RH	2024-T42 Bare	1.000 B	

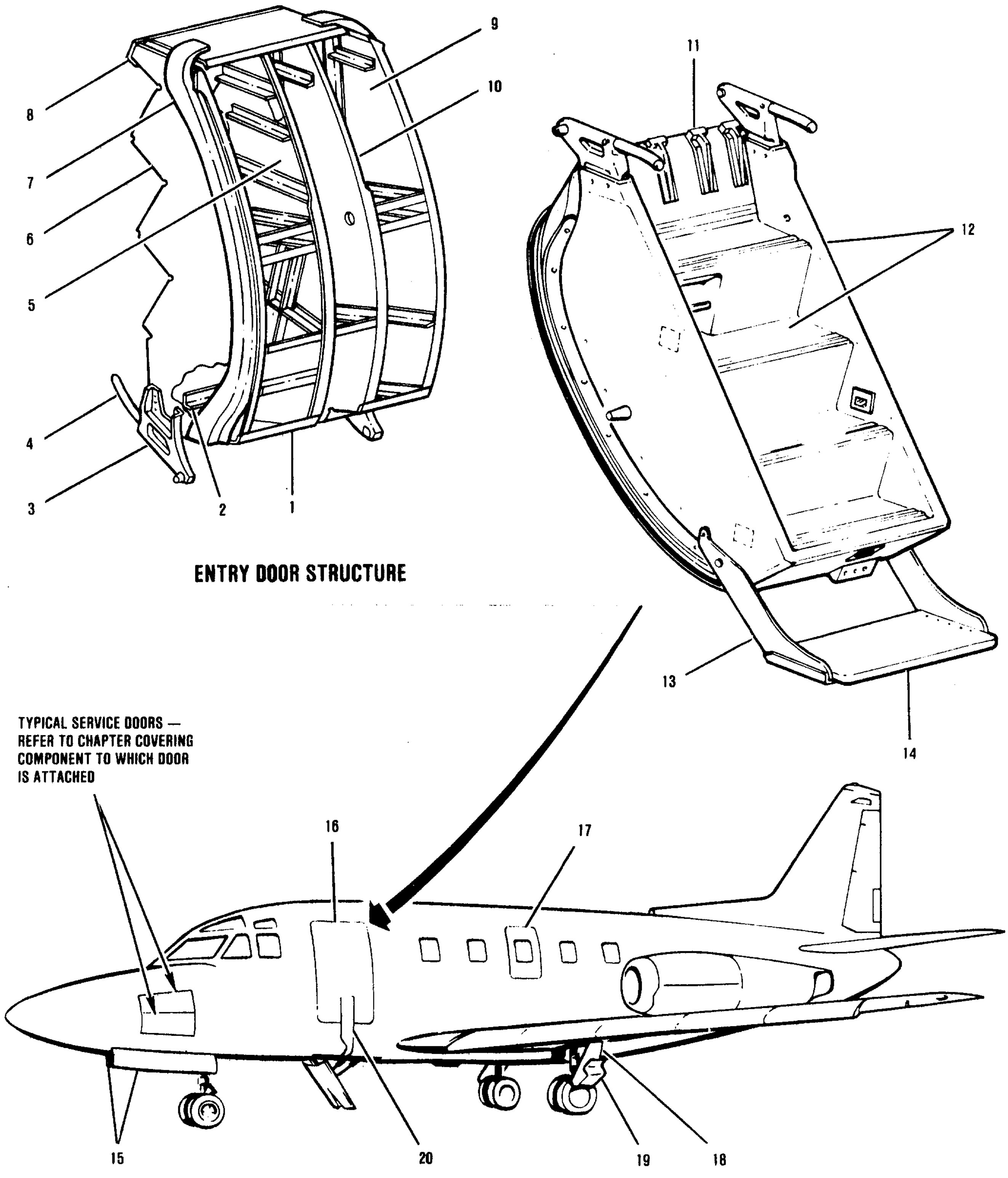
NOTES

- *For additional repairs, refer to 51-70-00.*

A *Figure number is in this chapter unless otherwise noted.*

B *This is a chem-milled or machined part. Measure thinned areas, or refer to applicable drawing numbers for thickness variation.*

Key to Figure 1
(Sheet 2 of 2)



Door Repair Index — With Modified Entry Door — Model NA 265-70
(S/N 370-1 and -7), -80, -80A, and -80SC
Figure 2

STRUCTURAL IDENTIFICATION (Continued)

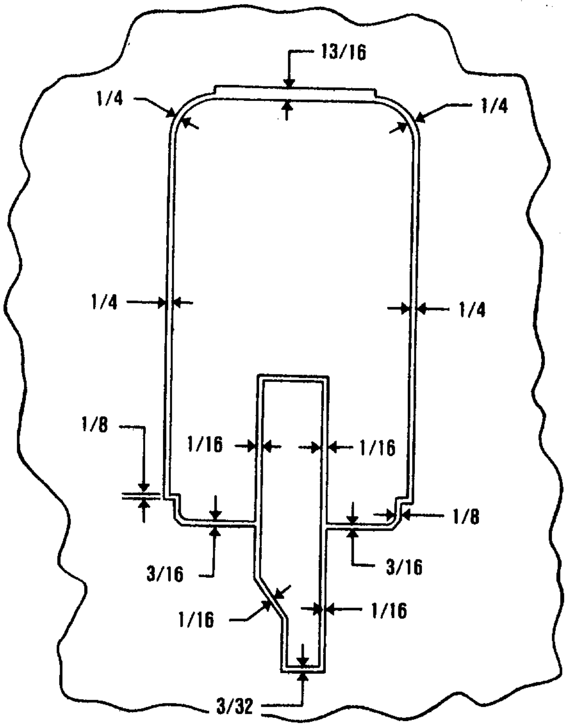
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.
1	265-300222-281	Angle	7178-T6 Bare	0.050
2	265-300222-29	Beam	7178-T6 Extr	6E1102
3	265-300215-31	Fitting-attaching arm support	7178-T6 Bare	2.250
4	380-300202-21	Handrail — entry door	6061-T6 Tube	0.049
5	265-300219-47	Frame — FS 155.25	7075-T6 Bare	0.040
6	265-300218-35	Frame — FS 146.812	7075-T6 Bare	0.032
7	265-300240-11	Door Land	Glass Fabric	0.010
8	265-300222-27	Angle	7178-T6 Extr	7AJ
9	265-300221-23	Frame — FS 170.187	7075-T6 Bare	0.032
10	265-300220-43	Frame — FS 161.750	7075-T6 Bare	0.040
11	370-300217-3	Reinforcement — Lower Stop	2014-T6 Al.	Die Forge
12	380-300260-5	Step Assembly	Molded Nylon	6UV Stab.
13	380-300208	Arm — Lower Step	7075-T6 Bare	0.250
14	380-300207-11	Step Assy — Lower Step		
	380-300207-3	Honeycomb Core	5052-H39	¼80.004
	380-300207-5	Facing Sheets	2024-T42 Bare	0.040
15	265-343301	Door — Nose Landing Gear	2024-T42 Clad	0.032
16	265-300238	Door — Main Entrance	2024-T3 Bare	0.050
17	370-300027	Door — Ground Escape	2024-T42 Bare	0.050
18	370-333351-3	Door — Strut, MLG	7075-T7351	1.380
19	370-333352-11	Door Assy — Wheel, MLG		
	370-333352-3	Plate	7075-T7351	1.130
	370-333352-7	Plate	6061-T6 Bare	0.250
20	265-300247	Cover — Entry Door Center Link		
	265-300247-3	Upper Cover	2024-T42 Bare	0.190
	265-300247-5	Lower Cover	7178-T6 Bare	0.100

S370-3-100

NOTE

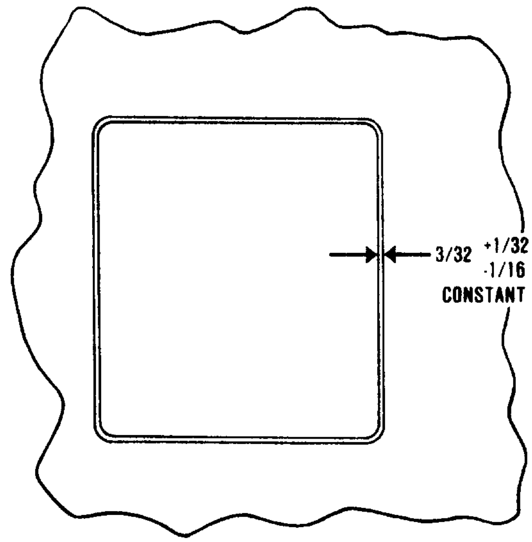
For additional repairs, refer to 51-70-00.

Key to Figure 2

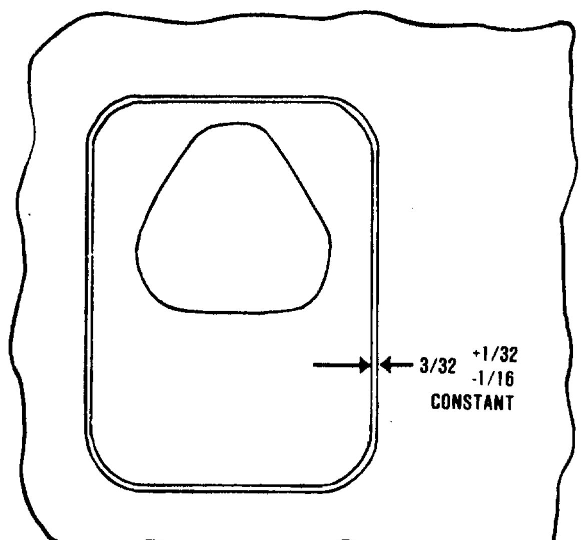


DOOR — FUSELAGE ENTRANCE

SKIN GAPS BETWEEN DOORS AND ADJACENT PARTS AND WITHIN THE DOOR ASSEMBLY ARE SHOWN. TOLERANCES FOR ALL DIMENSIONS ARE ±1/32 IN.



DOOR — GROUND EMERGENCY MODEL NA 265-40



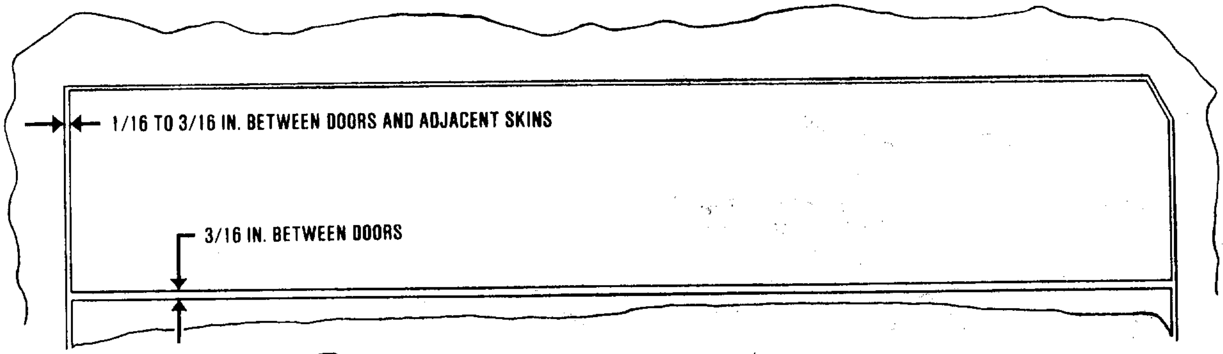
DOOR — GROUND EMERGENCY MODEL NA 265-60, -60A, AND -60SC

NOTES

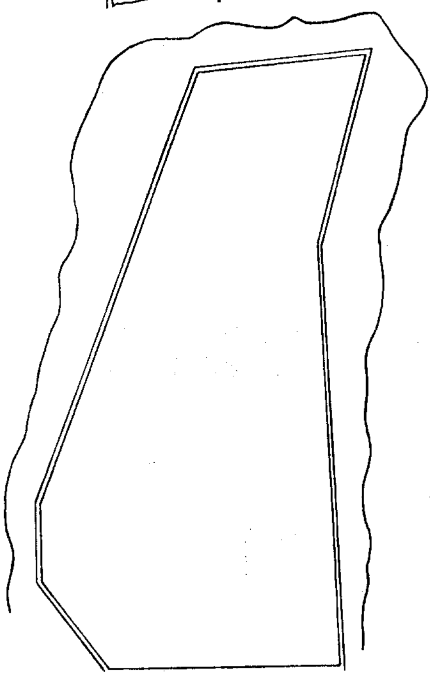
- SKIN GAP TOLERANCES NOT SPECIFICALLY SHOWN ARE 0 TO 1/16 IN.
- SKIN GAP TOLERANCES GIVEN ON THIS ILLUSTRATION ARE FOR THE FITTING OF NEW PARTS. REFER TO "SKIN GAP TOLERANCES" TEXT FOR PERMISSIBLE TOLERANCES WHEN FITTING PARTS THAT HAVE BEEN PREVIOUSLY INSTALLED ON ANOTHER AIRPLANE.

S265-3-100B

Skin Gap Diagram
Figure 3 (Sheet 1 of 3)

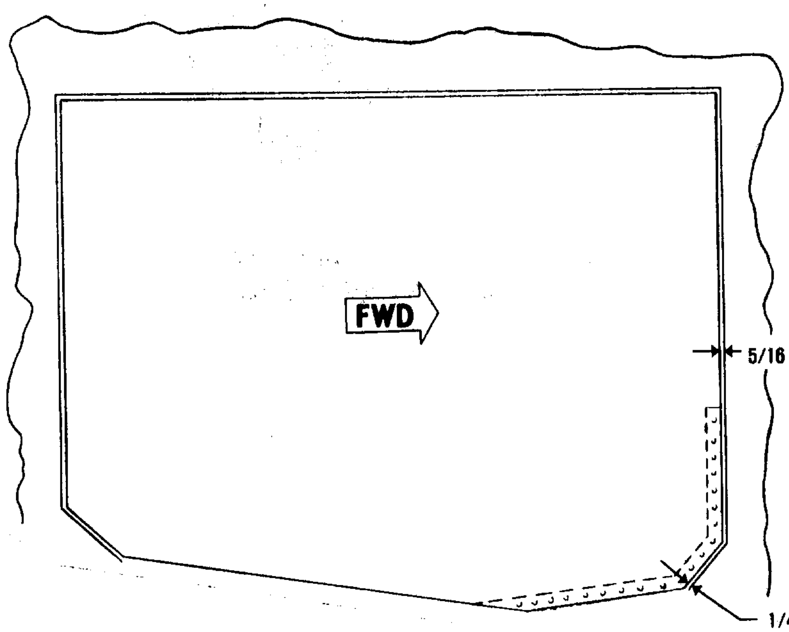


DOOR — NOSE LANDING GEAR



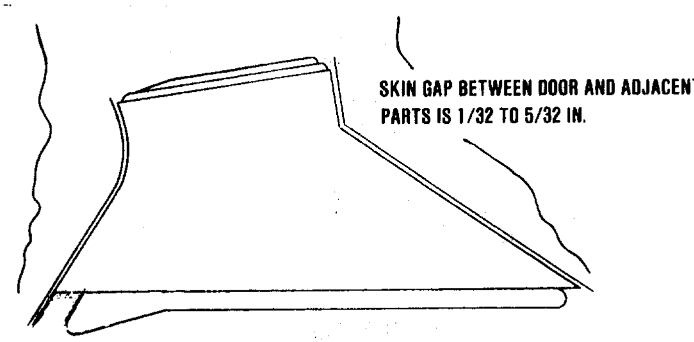
HINGED DOOR — LANDING MAIN GEAR
MODEL 265-40, -60, -60A, AND -60SC

SKIN GAP BETWEEN DOOR AND ADJACENT PARTS IS 1/32 TO 5/32 IN.



WHEEL DOOR — MAIN LANDING GEAR
MODEL NA 265-40, -60, -60A, AND -60SC

SKIN GAP BETWEEN DOOR AND ADJACENT PARTS IS 1/16 TO 3/16 IN.
EXCEPT AS NOTED.



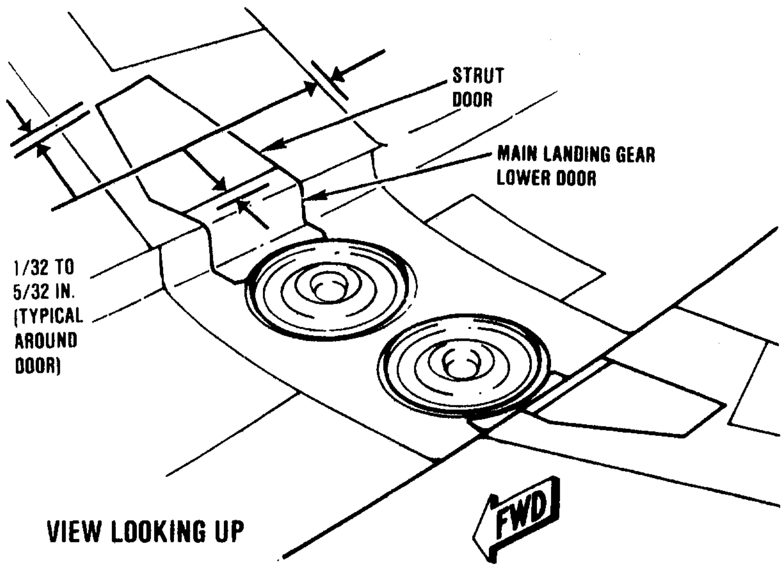
FIXED DOOR — MAIN LANDING GEAR
MODEL NA 265-40, -60, -60A, AND -60SC

NOTES

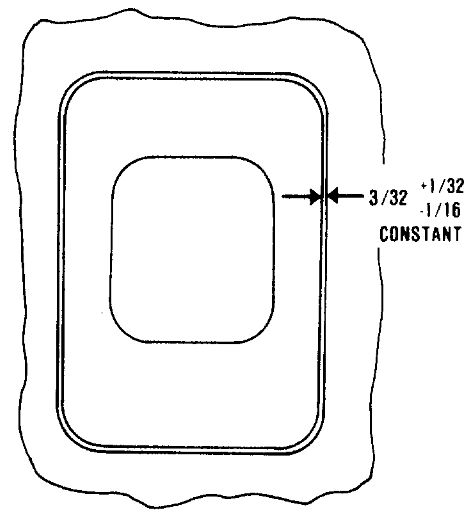
- SKIN GAP TOLERANCES NOT SPECIFICALLY SHOWN ARE 0 TO 1/16 IN.
- SKIN GAP TOLERANCES GIVEN ON THIS ILLUSTRATION ARE FOR THE FITTING OF NEW PARTS. REFER TO "SKIN GAP TOLERANCES" TEXT FOR PERMISSIBLE TOLERANCES WHEN FITTING PARTS THAT HAVE BEEN PREVIOUSLY INSTALLED ON ANOTHER AIRPLANE.

S265-3-101A

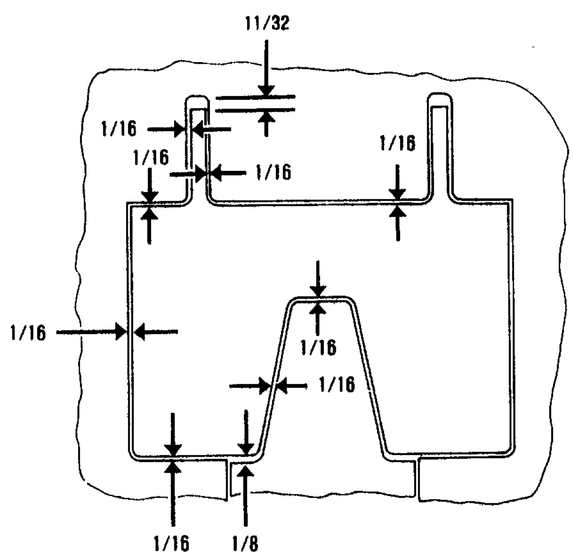
Skin Gap Diagram
Figure 3 (Sheet 2 of 3)



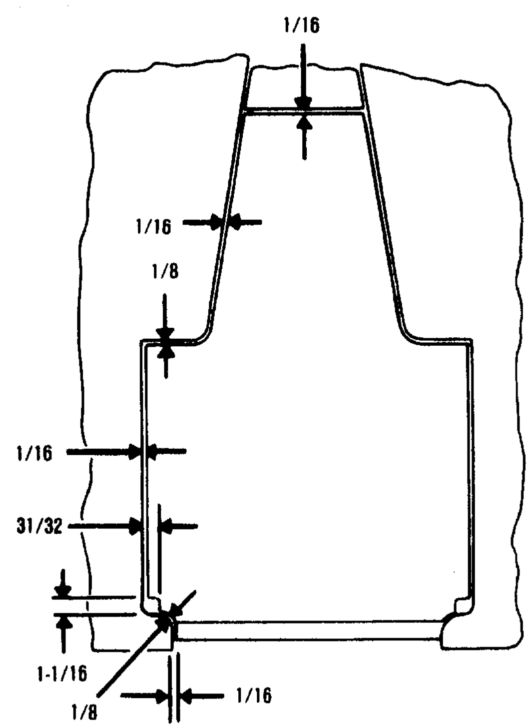
STRUT DOORS — MAIN LANDING GEAR
MODEL NA 265-70, -80, -80A, AND -80SC



DOOR — GROUND EMERGENCY
MODEL NA 265-70, -80, -80A, AND -80SC



SPEED BRAKE



OUTER DOOR — IN-FLIGHT ESCAPE HATCH

S370-3-21

Skin Gap Diagram
Figure 3 (Sheet 3 of 3)

MAIN ENTRANCE DOOR

STRUCTURAL IDENTIFICATION

GENERAL

This section contains information on the main entrance door. For negligible damage limits, refer to section 53-00-10. For repairs to the main entrance door, refer to 52-10-20.

MAIN ENTRANCE DOOR

REPAIR

GENERAL

This section contains repairs for the main entry door.

MAIN ENTRANCE DOOR STOP — INSPECTION AND REPAIR

NA 265-40, (S/N 282-1 thru -97, before S/B 3) and NA 265-60, (S/N 306-1 thru 306-63, before S/B 3.)

On affected airplanes, an aluminum extrusion is used for the mechanical stop on the lower end (closed position) of the entry door. Repeated door openings (particularly hard openings) and pressurization/depressurization cycles cause stress to the extrusion, sometimes causing longitudinal cracks along bottom side. Once started, these cracks spread rapidly, causing a complete fracture. If this occurs during flight, the door is retained by safety latch pins; however, partial depressurization may occur. To prevent such an occurence, the lower door stop is dye penetrant inspected. If no cracks are detected, the inspection is repeated at 600 hour intervals.

INSPECTION

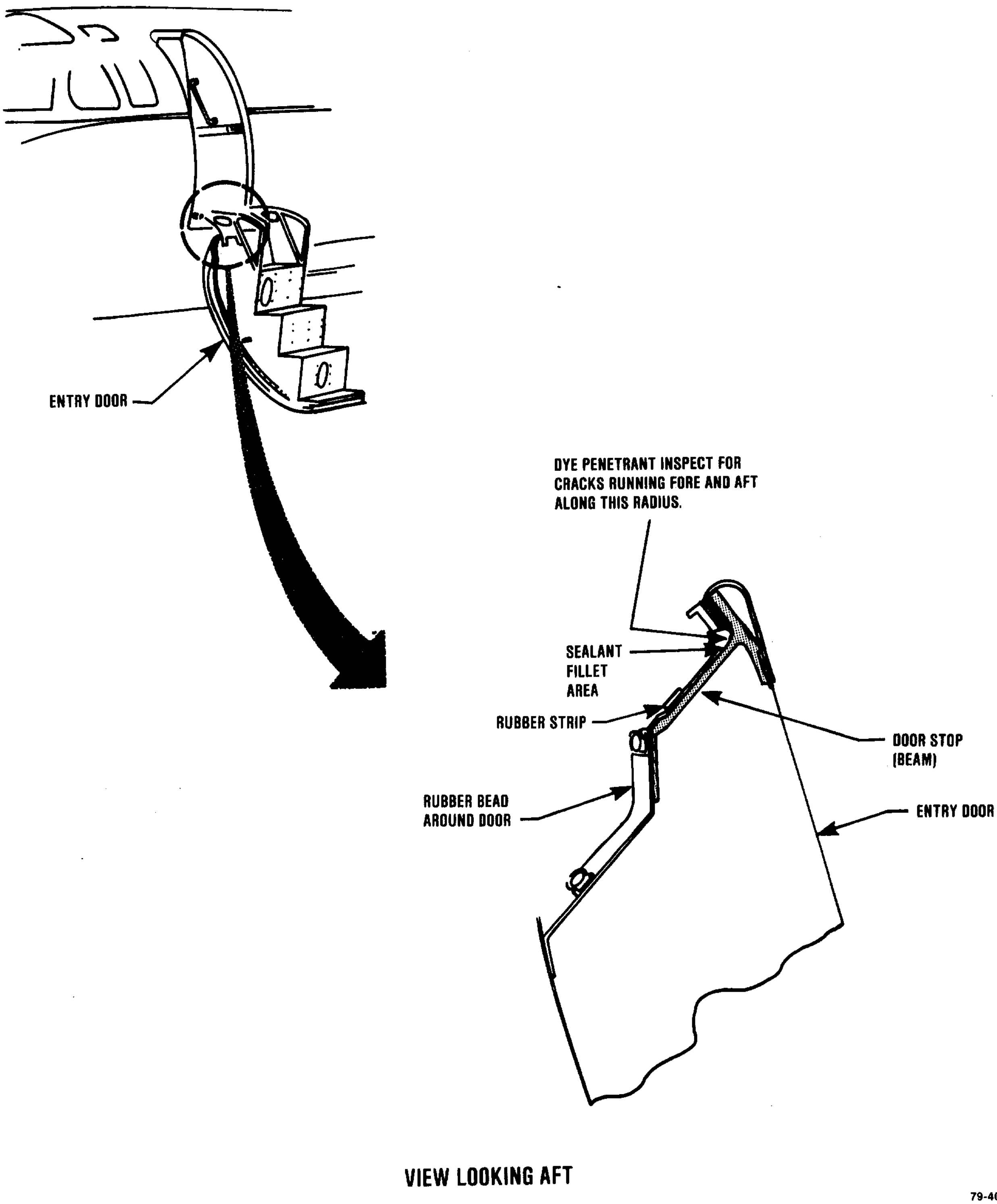
Inspect entry door as follows:

1. Open entry door.
2. Remove all paint and primer from door stop (beam) radius area, the full width of door.
3. Using non-metallic scraper and methy ethyl ketone, (MEK) or equivalent, remove excess sealant from inspection area.
4. Peform dye penetrant inspection of radius area on lower door stop (beam).
5. If door stop (beam) is cracked, entry door must be repaired before airplane is flown (except unpressurized flight to repair station).
6. If no cracks are found, clean off all inspection residue.
7. Coat bare aluminum surfaces with alodine.
8. Replace sealant (PR1422GB) removed for access to area.
9. Prime and paint area to match entry door finish.

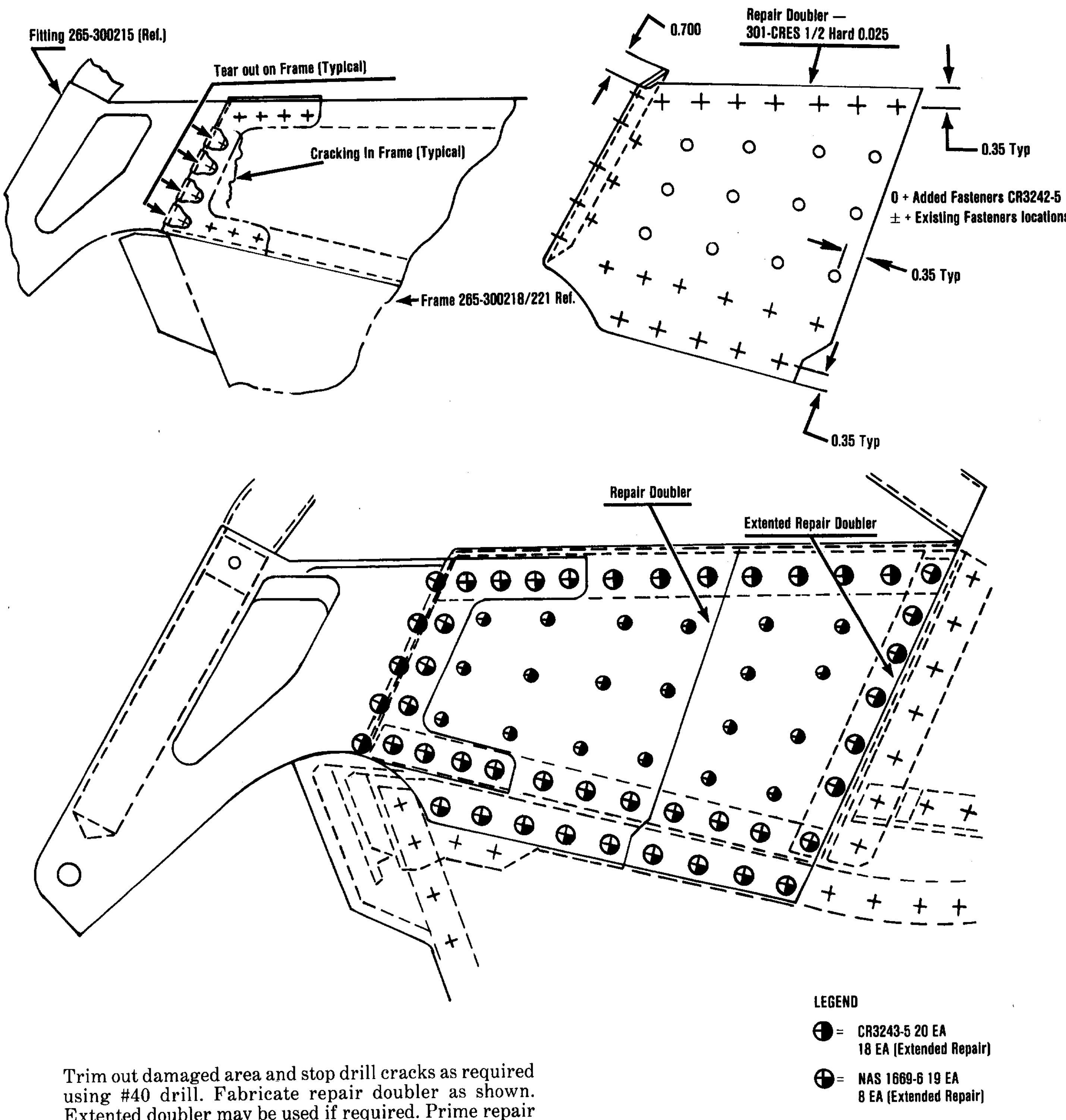
REPAIR

If lower door stop is cracked, two options are available:

1. Incorporate S/B 3.
2. Replace door stop.



Inspection and Repair — Main Entrance Door —
Model NA 265-40 (S/N 282-1 thru -97) and NA 265-60 (S/N 306-1 thru -63)
Figure 201



Trim out damaged area and stop drill cracks as required using #40 drill. Fabricate repair doubler as shown. Extented doubler may be used if required. Prime repair doubler and all mating surfaces with Polyamide Epoxy Primer and assemble using faying surface sealant PR 1431G or equivalent. Install NAS1669-6 fasteners (Jo Bolt) using wet polyamide epoxy primer.

Figure 202. — Repair — Main Entrance Door

LANDING GEAR DOORS

STRUCTURAL IDENTIFICATION

GENERAL

This section contains information on the landing gear doors. See section 52-80-10 for negligible damage limits. See section 52-80-20 for repairs.

LANDING GEAR DOORS

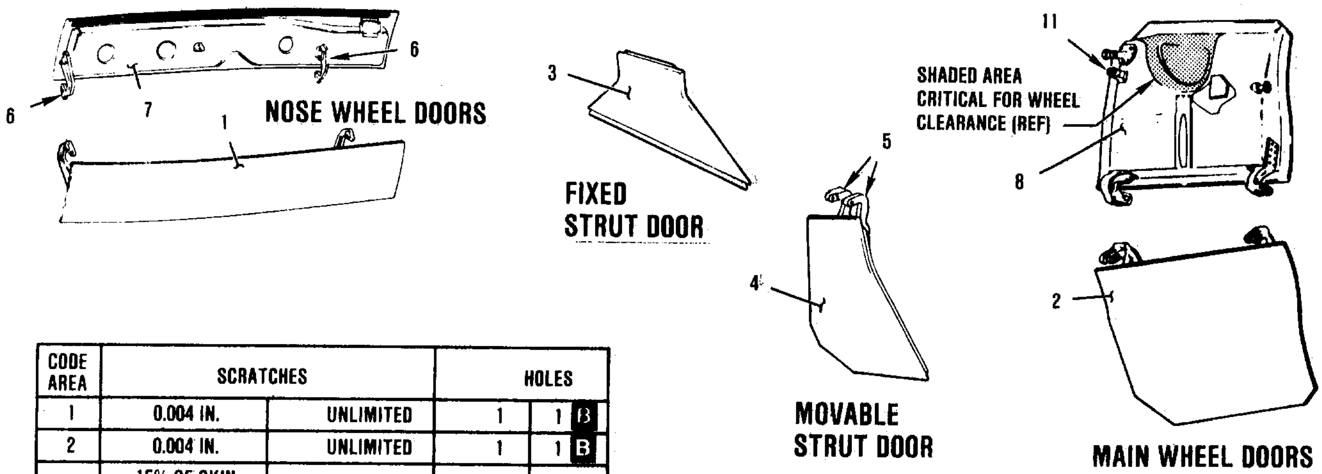
ALLOWABLE DAMAGE

GENERAL

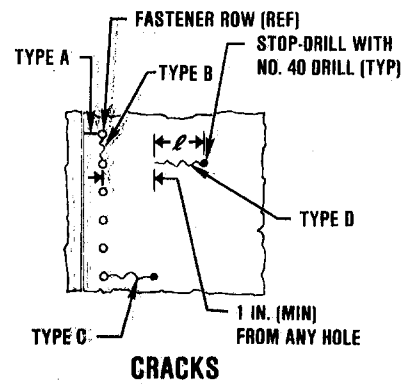
This section contains negligible damage limits for the landing gear doors.

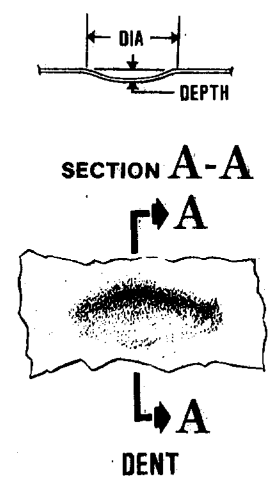
NEGLIGIBLE DAMAGE LIMITS

See figure 101 (Sheet 1 of 2) for negligible damage limits for Model NA 265-40, -60, -60A, -60SC, and -65. See 101 (Sheet 2 of 2) for negligible damage limits for Model NA 265-70, -80, -80A, and -80SC.



CODE AREA	SCRATCHES		HOLES	
1	0.004 IN.	UNLIMITED	1	1 B
2	0.004 IN.	UNLIMITED	1	1 B
3	15% OF SKIN THICKNESS	UNLIMITED	1	1 B
4	15% OF SKIN THICKNESS	UNLIMITED	1	1 B
5	0.008 IN.	ACROSS ANY 1 SURFACE	NONE	—
6	0.008 IN.	ACROSS ANY 1 SURFACE	NONE	—
7	0.005 IN.	UNLIMITED	1	1 B
8	0.004 IN.	UNLIMITED	1	1 B
9	0.008 IN.	ACROSS ANY 1 SURFACE	NONE	—
10	NONE	—	NONE	—
11	NONE	—	NONE	—





DENTS		
CODE AREA	DIA C (IN.)	DEPTH IN IN. (MAX)
1, 2, 7, & 8	1/4 TO 1/2	0.008
	1/2 TO 1	0.012
	1 TO 3	0.020
3 & 4	1/4 TO 1/2	0.012
	1/2 TO 1	0.015
	1 TO 3	0.030
5, 6, 9, & 11	NOT APPLICABLE	

NOTES

- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT DESCRIBED IN 51-70-70.
- DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR.

A A COMBINATION OF TWO OF THE ABOVE CRACKS MAY EXIST AT THE SAME TIME IN ONE BAY, EXCEPT FOR TYPE D WHICH IS LIMITED TO ONE PER BAY AND THREE OVER ENTIRE SURFACE.

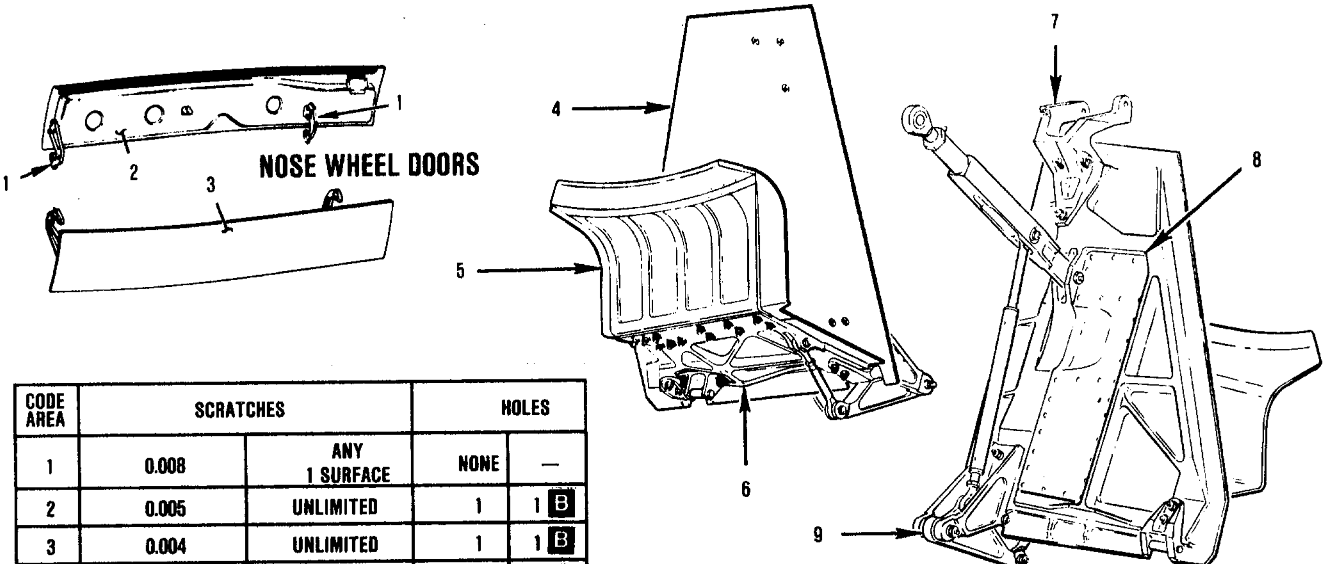
B ONE IN. FROM ANY STIFFENER OR FASTENER.

C DIAMETER IS SHORTEST DISTANCE ACROSS DENT.

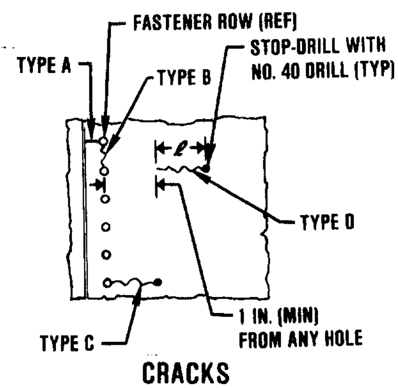
CRACKS				
CODE AREA	TYPE A	TYPE B	TYPE C	TYPE D
1	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
2	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
3	NONE	NONE	NONE	1 PER PANEL ℓ ≤ 1 IN.
4	NONE	NONE	NONE	1 PER PANEL ℓ ≤ 1 IN.
5	NONE	NONE	NONE	NONE
6	NONE	NONE	NONE	NONE
7 A	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
8	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
9	NONE	NONE	NONE	NONE
10	NONE	NONE	NONE	NONE
11	NONE	NONE	NONE	NONE

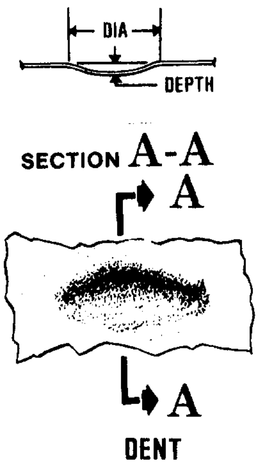
S265-3-103

Negligible Damage — Landing Gear Doors —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 101 (Sheet 1 of 2)



CODE AREA	SCRATCHES		HOLES	
1	0.008	ANY 1 SURFACE	NONE	—
2	0.005	UNLIMITED	1	1 [B]
3	0.004	UNLIMITED	1	1 [B]
4	0.025	UNLIMITED [A]	1	1 [B]
5	0.025	UNLIMITED	1	1 [B]
6	0.025	UNLIMITED [A]	1	1 [B]
7	0.008	ANY 1 SURFACE	NONE	—
8	0.008	UNLIMITED	1	1 [B]
9	0.008	ANY 1 SURFACE	NONE	—
10				
11				





DENTS		
CODE AREA	DIA [C] (IN.)	DEPTH IN IN. (MAX)
2, 3, 8	1/4 TO 1/2	0.008
	1/2 TO 1	0.012
	1 TO 3	0.020
4, 5, 6	1/4 TO 1/2	0.012
	1/2 TO 1	0.015
	1 TO 3	0.030
7, 8	NOT APPLICABLE	

CRACKS				
CODE AREA	TYPE A	TYPE B	TYPE C	TYPE D
1 [A]	NONE	NONE	NONE	NONE
2 [A]	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
3	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
4	NONE	NONE	NONE	1 PER PANEL ℓ ≤ 1 IN.
5	NONE	NONE	NONE	1 PER PANEL ℓ ≤ 1 IN.
6	NONE	NONE	NONE	NONE
7	NONE	NONE	NONE	NONE
8	1 PER PANEL	1 PER PANEL	1 PER PANEL ℓ ≤ 1 IN.	1 PER PANEL ℓ ≤ 1 IN.
9	NONE	NONE	NONE	NONE

NOTES

- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.
- DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR.

[A] A COMBINATION OF TWO OF THE ABOVE CRACKS MAY EXIST AT THE SAME TIME IN ONE BAY, EXCEPT FOR TYPE D WHICH IS LIMITED TO ONE PER BAY AND THREE OVER ENTIRE SURFACE.

[B] ONE IN. FROM ANY STIFFENER OR FASTENER.

[C] DIAMETER IS SHORTEST DISTANCE ACROSS DENT.

S370-3-20

Negligible Damage — Landing Gear Doors —
Model NA 265-70, -80, -80A, and -80SC
Figure 101 (Sheet 2 of 2)

LANDING GEAR DOORS

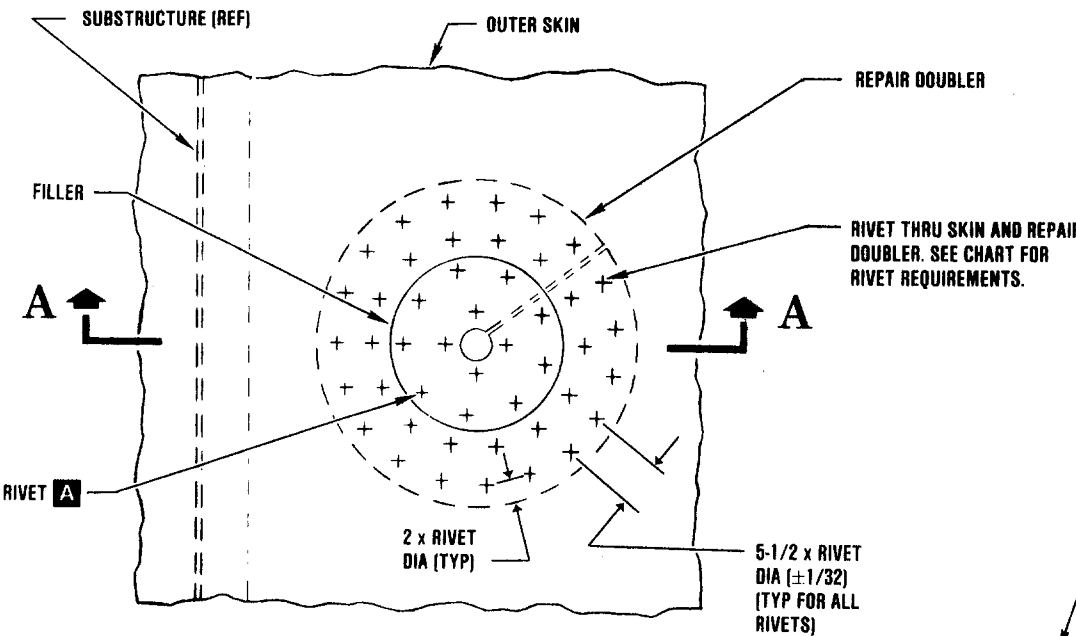
REPAIR

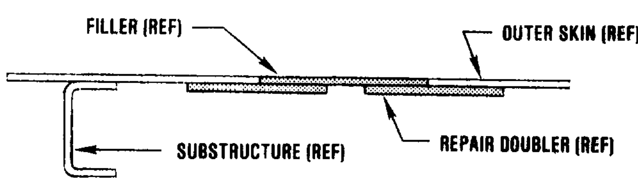
GENERAL

This section contains repairs to the landing gear doors.

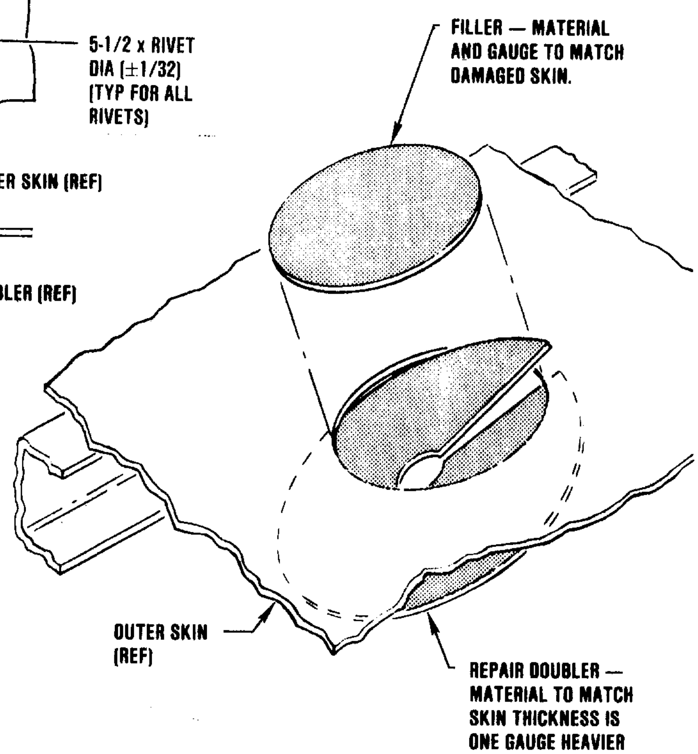
REPAIRS

Repairs in this section are applicable for both inner and outer skins of the main landing gear and nose landing gear doors. For applicability of repairs, refer to 52-00-00.





SECTION A-A



REPAIRING OUTER SKIN

1 Trim out damage. Shape of the opening may be circular as shown (with a split circular repair doubler) or rectangular (with a solid one-piece doubler).

2 Provide access hole in inner skin for bucking rivets in outer skin repair (except when blind rivets are used in 0.040 in. skins).

3 Fabricate and install outer skin repair parts.

4 Fabricate and install inner skin repair parts. (See "Landing Gear Door Inner Skin Repair.")

NOTES

- THIS REPAIR IS APPLICABLE TO OUTER SKINS ON THE MAIN AND NOSE LANDING GEAR DOORS.
- THE INNER SKIN REPAIR MAY BE USED TO CLOSE OUT AN ACCESS HOLE PROVIDED FOR REPAIR OF THE OUTER SKIN.

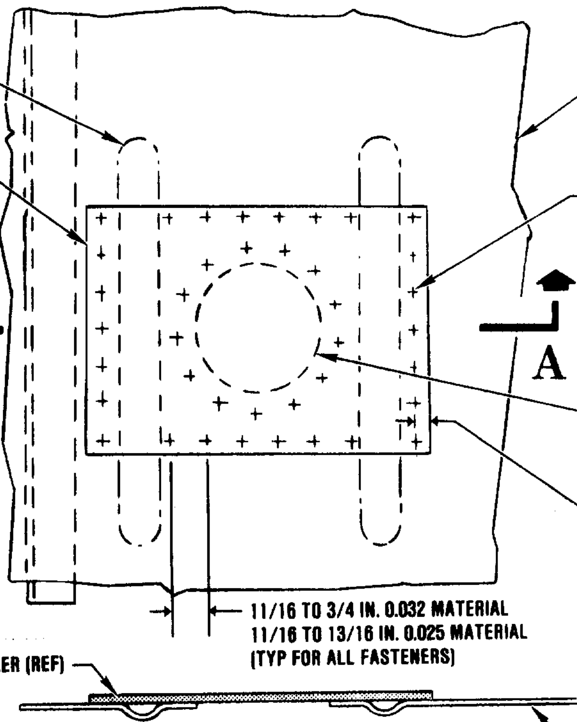
A USE TWO ROWS OF RIVETS IN SPLIT REPAIR DOUBLER. USE ONE ROW OF RIVETS IN SOLID ONE-PIECE REPAIR DOUBLER. (SEE CHART FOR RIVET OPTIONS.)

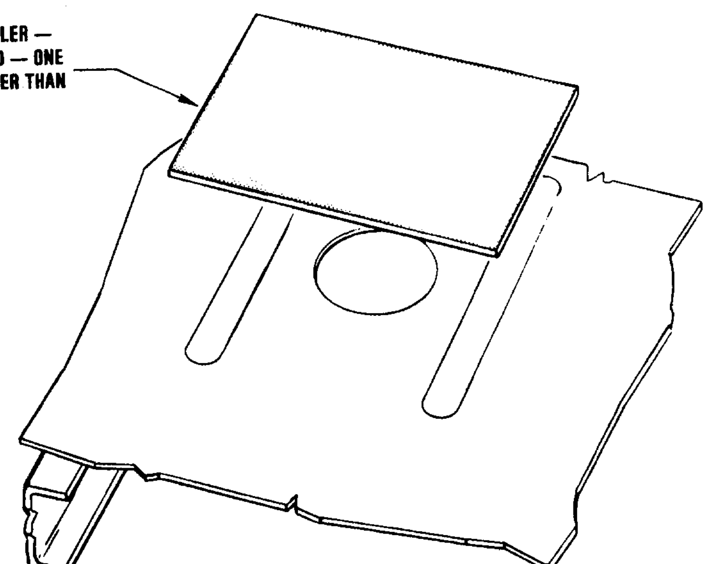
RIVET REQUIREMENTS

MATERIAL	GAUGE	RIVET	ROWS REQD	INSTALLATION
2024T42	0.032	NAS1097AD4	2	DIMPLE
7075-T6	0.032	NAS1097AD4	2	CSK
7075-T6	0.040	NAS1097AD5	2	CSK
7075-T6	0.040	MS20601MP4	2	CSK

S265-3-104

Landing Gear Door Outer Skin Repair —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 201





NOTE

THE REPAIRS SHOWN ARE APPLICABLE TO LANDING GEAR DOOR INNER SKIN AS FOLLOWS:

SKETCH 1 — MAIN AND NOSE GEAR, AS REPAIR AND AS CLOSE-OUT FOR ACCESS HOLE.

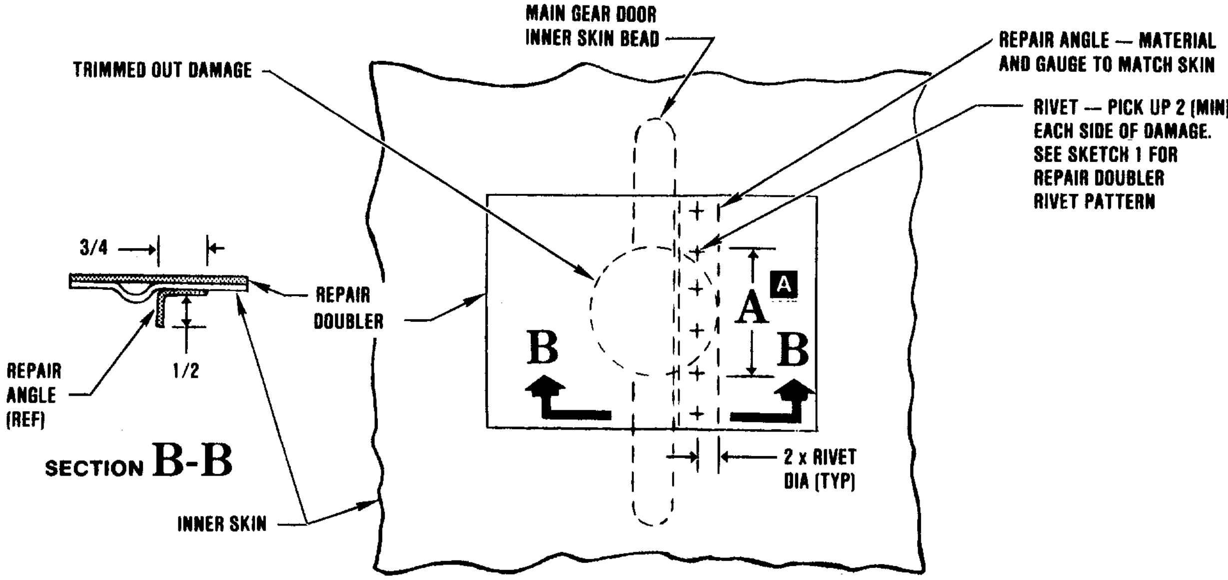
SKETCH 2 — MAIN GEAR, WHEN DAMAGE IS ACROSS A BEAD.

SKETCH 3 — NOSE GEAR, WHEN DAMAGE AFFECTS A LIGHTENING HOLE FLANGE.

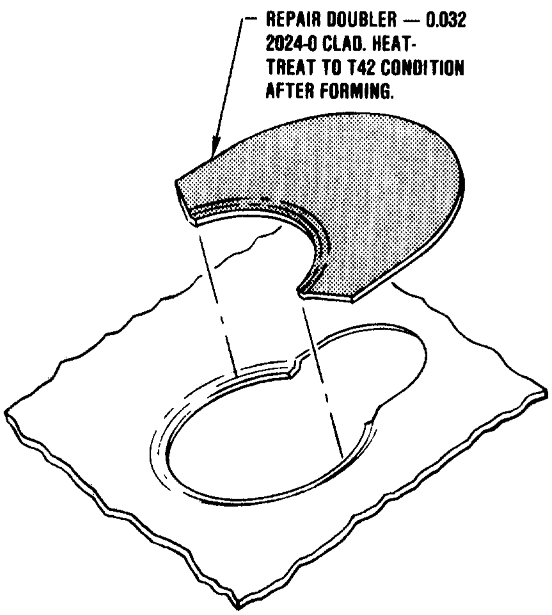
SKETCH 1
BLIND REPAIR DAMAGE BETWEEN SUBSTRUCTURES AND BETWEEN BEADS

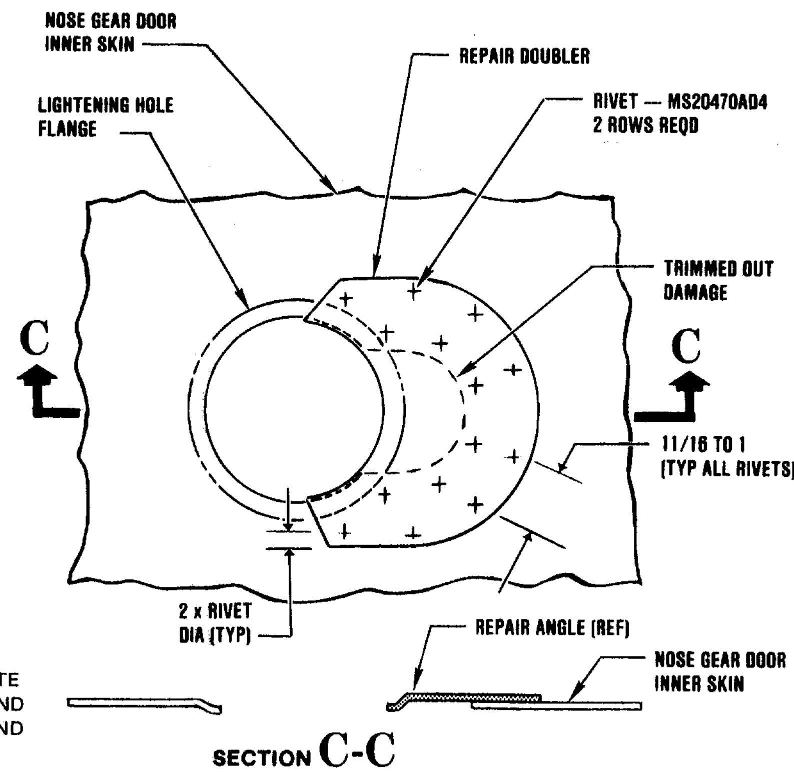
S265-3-105

Landing Gear Door Inner Skin Repair — Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 1 of 2)



SKETCH 2
BLIND REPAIR DAMAGE ACROSS A SKIN BEAD (MAIN GEAR DOOR)





NOTE

A WHEN DIMENSION "A" EXCEEDS 1-1/4 IN., FABRICATE FILLER (MATERIAL AND GAUGE TO MATCH SKIN) AND INSTALL RIVETS THROUGH ANGLE, FILLER, AND REPAIR DOUBLER AT 11/16 TO 1-1/4 IN. SPACING.

SKETCH 3
DAMAGE AT LIGHTENING HOLE FLANGE (NOSE GEAR DOOR)

S265-3-106

Landing Gear Door Inner Skin Repair —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 2 of 2)

CHAPTER

53

FUSELAGE

CHAPTER 53

FUSELAGE

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CHAPTER 53

FUSELAGE

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Continued)

CHAPTER 53

FUSELAGE

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	2*	Mar 16/90
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	2	Jun 3/88
53-00-00	1	Aug 17/84
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* The asterisk indicates pages revised, added, or deleted by the current revision.

LIST OF EFFECTIVE PAGES

Chapter/ Section		Page	Date
53-30-20		201	Jun 3/88
		202	Jun 3/88
		203	Jun 3/88
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	Deleted	215	Jun 3/88
		216	Jun 3/88
		217*	Mar 16/90
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		219	Jun 3/88
		220*	Mar 16/90
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		210	Aug 17/84

* The asterisk indicates pages revised, added or deleted by the current revision.

CHAPTER 53

FUSELAGE

STRUCTURAL IDENTIFICATION

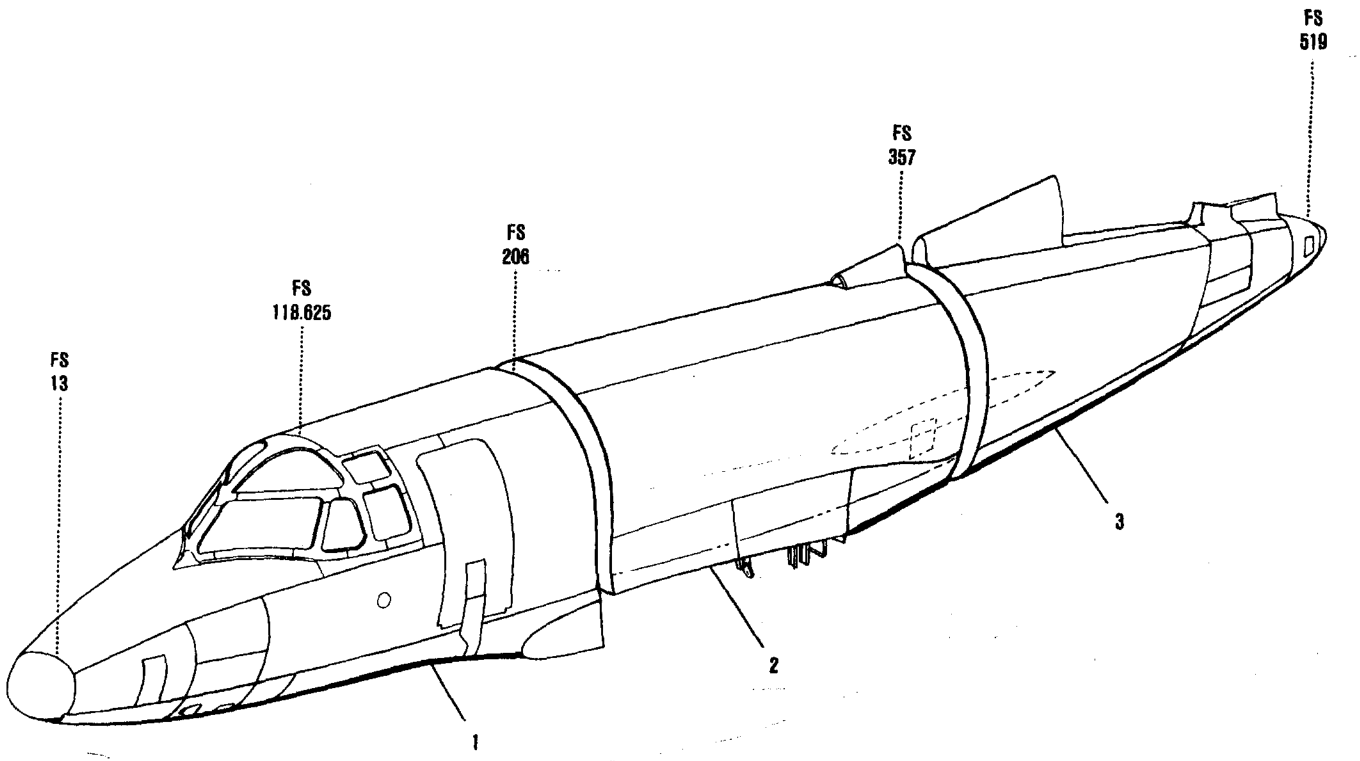
GENERAL

The fuselage is of all-metal semimonocoque construction. Chem-milled aluminum alloy stressed skins, along with formed sheet-metal and extruded frames (some of which are chem-milled), carry the shear loads. The major portion of the bending loads is carried by the four main longerons. The remainder of the bending loads is carried by the various stringers, intercostals, and secondary longerons. Chem-milling has been utilized throughout the fuselage.

The fuselage illustrations are divided into three sections for purposes of indexing: the fwd fuselage section (FS 0 to 206), the intermediate fuselage section (FS 206 to 357), and the aft FS 357. Both the fwd and the intermediate sections are pressurized. The pressurized area extends aft from FS 76 in the fwd fuselage to FS 333-5/8 in the intermediate fuselage.

FUSELAGE MASTER REPAIR INDEX

See figure 1 for model NA 265-40, -60, -60A, -60SC, and -65. See figure 2 for model NA 265-70, -80, -80A, and -80SC.



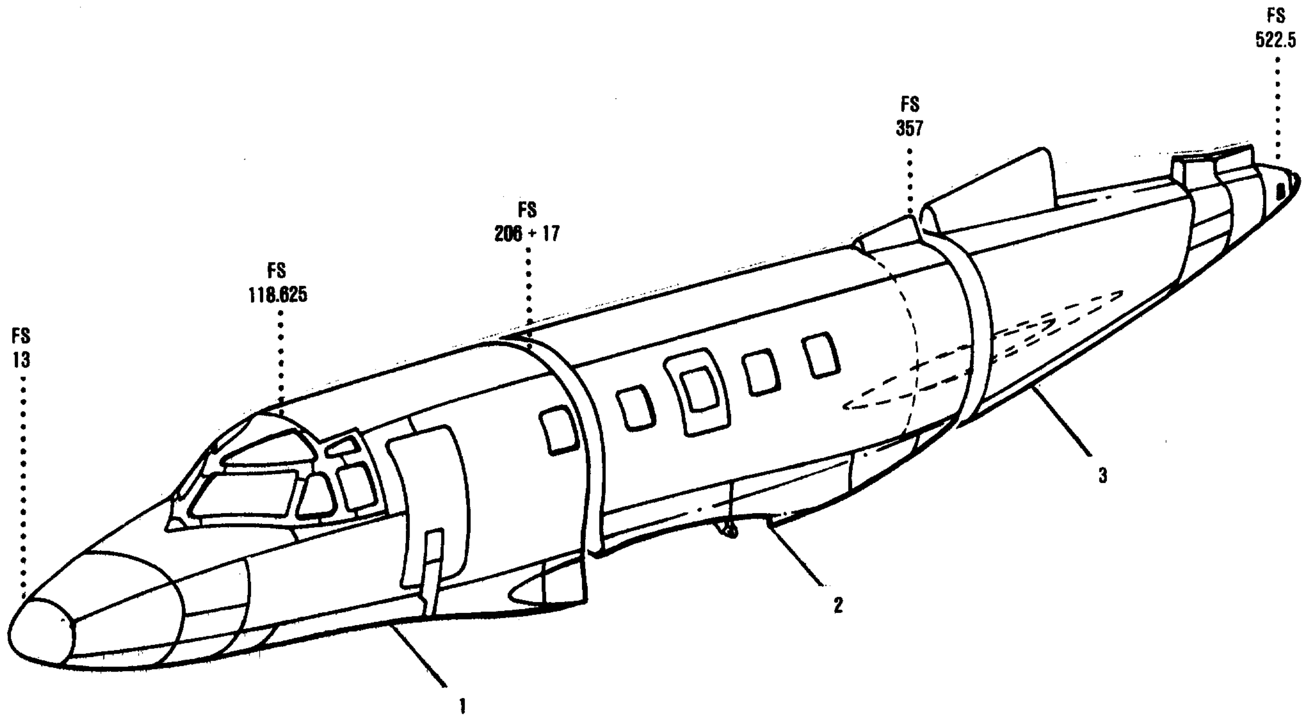
ITEM NO.	NOMENCLATURE	REPAIR INDEX ASSY NO.	FIGURE NO.
1	FORWARD FUSELAGE ASSY	265-311001	53-10-00, Fig 1
	INTERMEDIATE FUSELAGE ASSY (NA 265-40)	265-312001	53-10-00, Fig 3
2	INTERMEDIATE FUSELAGE ASSY (NA 265-60, -60A, -60SC, AND -65)	306-312001	53-10-00, Fig 4
3	AFT FUSELAGE ASSY	265-313001	53-10-00, Fig 6

NOTE

REFER TO 53-00-10 FOR NEGLIGIBLE DAMAGE LIMITATIONS.

S265-3-107A

Fuselage Master Repair Index —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1



ITEM NO.	NOMENCLATURE	ASSY NO.	REPAIR INDEX FIGURE NO.
1	FORWARD FUSELAGE ASSY	370-311001	53-10-00, Fig 2
2	INTERMEDIATE FUSELAGE ASSY	370-312001	53-10-00, Fig 5
3	AFT FUSELAGE ASSY	370-313001	53-10-00, Fig 7

NOTE

REFER TO 53-00-10 FOR NEGLIGIBLE DAMAGE LIMITATIONS.

S370-3-23

**Fuselage Master Repair Index —
Model NA 265-70, -80, -80A, and -80SC
Figure 2**

FUSELAGE

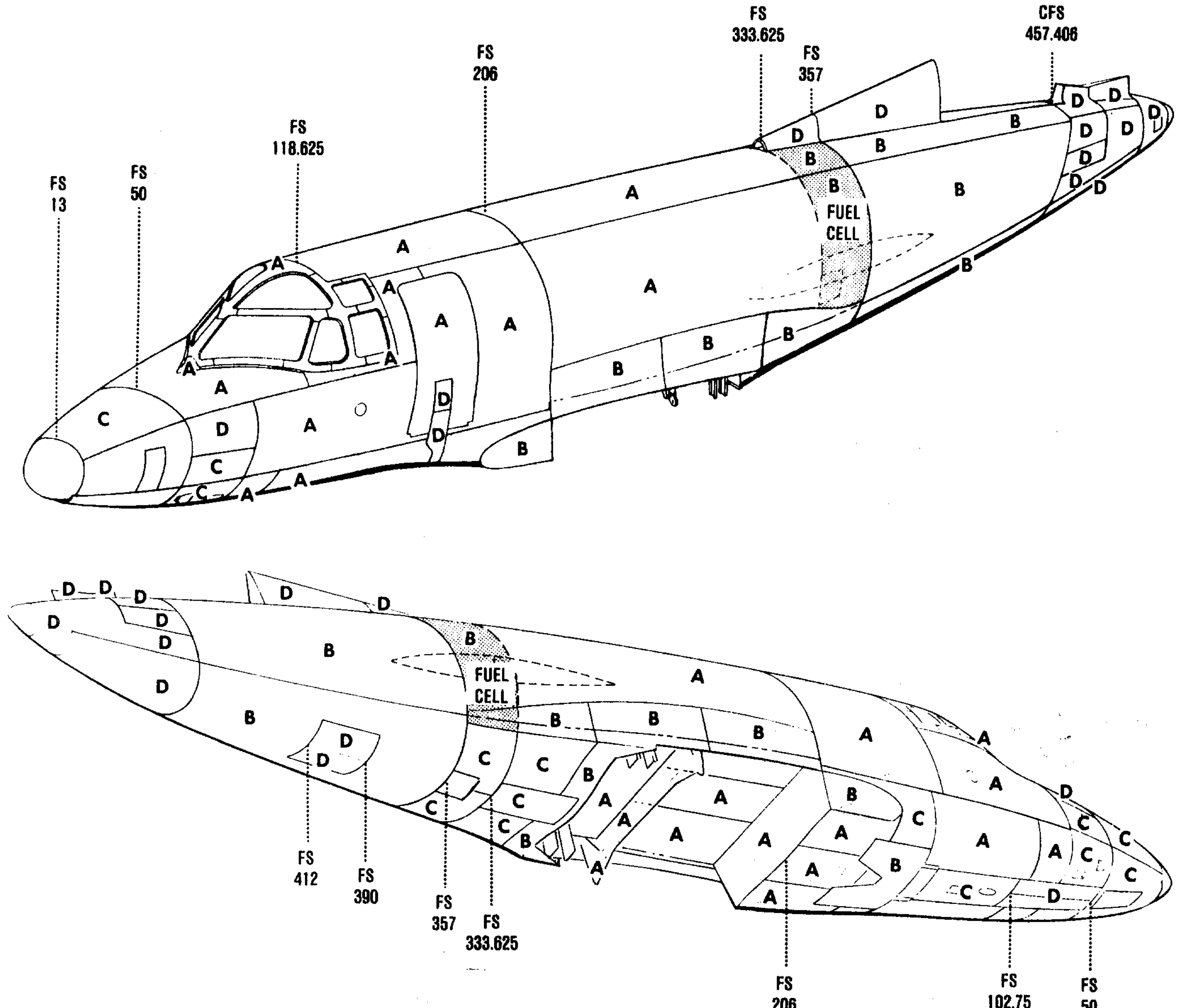
ALLOWABLE DAMAGE

GENERAL

This section contains negligible damage limits for the fuselage.

FUSELAGE NEGLIGIBLE DAMAGE LIMITS

Negligible damage limitations for the fuselage are given in figure 101. Damage within limits shown can be considered negligible only after being treated as instructed in 51-70-00.



ALL FUSELAGE SKINS ARE CONSIDERED TO BE IN ONE OF FOLLOWING CATEGORIES:

A PRIMARY — HIGHLY LOADED AND PRESSURIZED
B PRIMARY — HIGHLY LOADED & NONPRESSURIZED
C PRIMARY — NOT HIGHLY LOADED
D SECONDARY — NONSTRUCTURAL

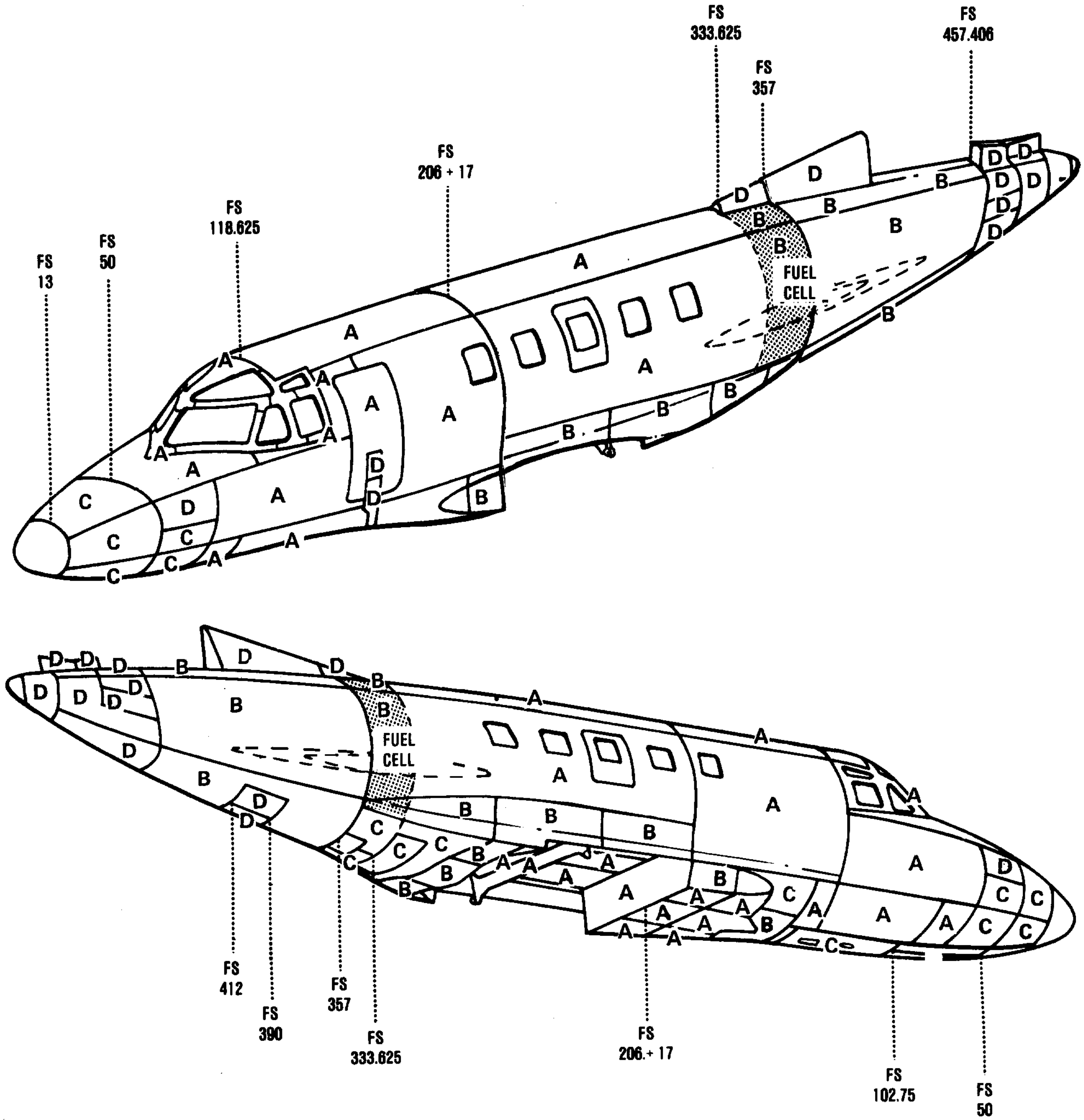
NOTE

DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN "REPAIR" IN 51-70-70.

MODEL NA 265-40, -60, -60A, -60SC, AND -65 AIRPLANES

S265-3-108A

Negligible Damage Limits — Fuselage Structure
Figure 101 (Sheet 1 of 4)



NOTE

DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN "REPAIR" IN 51-70-70.

ALL FUSELAGE SKINS ARE CONSIDERED TO BE IN ONE OF FOLLOWING CATEGORIES:

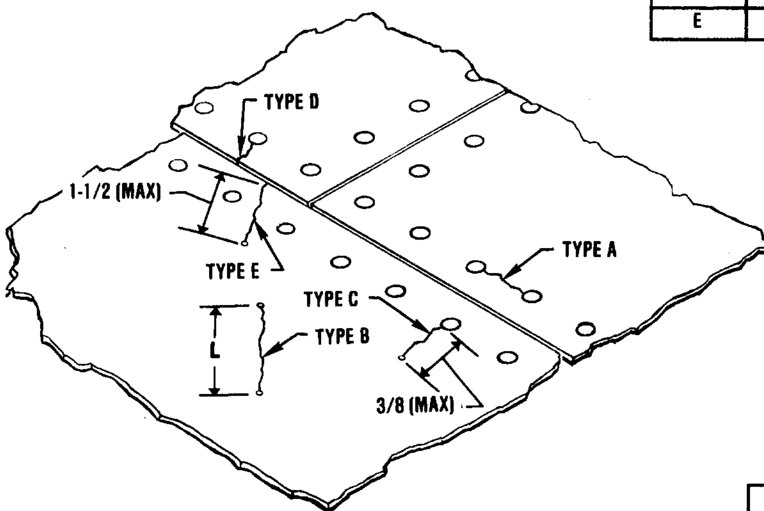
A PRIMARY — HIGHLY LOADED AND PRESSURIZED
B PRIMARY — HIGHLY LOADED & NONPRESSURIZED
C PRIMARY — NOT HIGHLY LOADED
D SECONDARY — NONSTRUCTURAL

MODEL NA 265-70, -80, -80A, AND -80SC

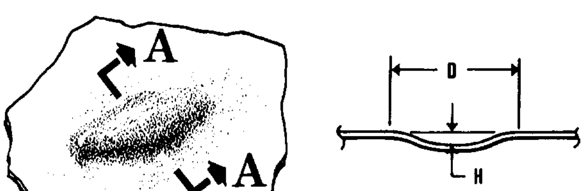
S370-3-24

Negligible Damage Limits — Fuselage Structure
Figure 101 (Sheet 2 of 4)

CRACKS				
TYPE	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
L	—	—	3/4 (MAX)	1-1/2 (MAX)
A	NONE	NONE	NONE	1 PER 20 RIVETS
B	NONE	NONE	1 PER PANEL	1 PER PANEL
C	NONE	NONE	1 PER PANEL	1 PER PANEL
D	NONE	NONE	NONE	1 PER 20 RIVETS
E	NONE	NONE	1 PER 20 RIVETS	1 PER PANEL



HOLES [A]		
CATEGORY	DIA IN IN.	NO. PER BAY (MAX)
A	NONE	—
B	NONE	—
C	3/4	1
D	1	2



SECTION A-A

SCRATCHES				
	LONGITUDINAL		VERTICAL	
CATEGORY	DEPTH	LENGTH	DEPTH	LENGTH
A	0.002	3	0.002	6
B	0.003	5	0.003	8
C	0.004	6	0.004	10
D	0.005	6	0.005	10

DENTS [B]					
[C] D + 1/4 TO 1/2		[C] D + 1/2 TO 1		[C] D + 1 TO 3	
CATEGORY	H	CATEGORY	H	CATEGORY	H
A	0.005	A	0.008	A	0.012
B	0.008	B	0.012	B	0.020
C	0.012	C	0.015	C	0.030
D	0.015	D	0.020	D	0.040

NOTES

- STOP DRILL ALL CRACKS WITH A NO. 40 (0.098 IN.) DRILL.

[A] HOLES MUST BE A MINIMUM OF 1/2 IN. FROM ANY FASTENER OR OTHER HOLE.

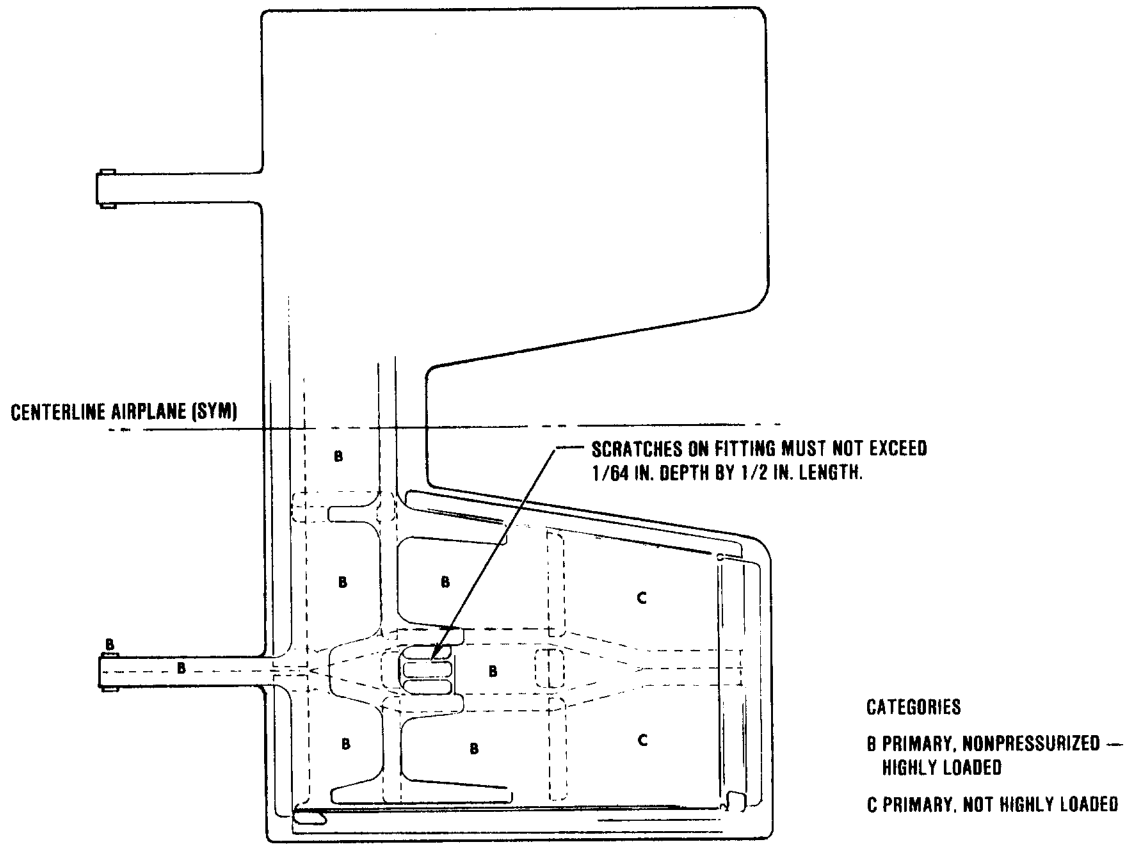
[B] DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR.

[C] "D" IS SHORTEST DISTANCE ACROSS DENT.

S265-3-109

Figure 101 — Negligible Damage Limits — Fuselage Structure(Sheet 3 of 4)

SPEED BRAKE

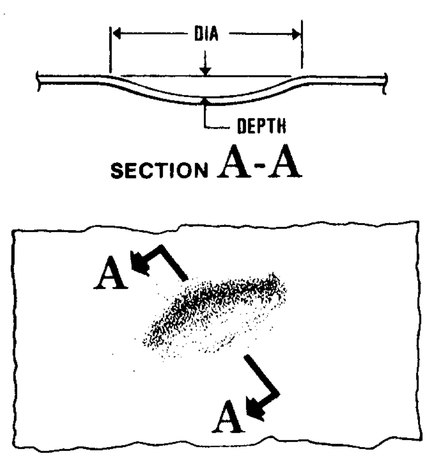


DENTS

DIA	CATEGORY	DEPTH
1/4 — 1/2	B	0.008
	C	0.012
1/2 — 1	B	0.012
	C	0.015
1 — 3	B	0.020
	C	0.030

SCRATCHES

CATEGORY	LONGITUDINALLY		LATERALLY	
	DEPTH	LENGTH	DEPTH	LENGTH
B	0.003	5	0.003	8
C	0.004	6	0.004	10



NOTES

- DAMAGE CANNOT BE CONSIDERED NEGLIGIBLE UNTIL TREATED AS DESCRIBED IN 51-70-70.
- HOLES IN SPEED BRAKE SKINS CANNOT BE CONSIDERED NEGLIGIBLE. ALL HOLES MUST BE STRUCTURALLY REPAIRED.
- ALL CRACKS IN SPEED BRAKE SKINS ARE TO BE TREATED AS HOLES AND STRUCTURALLY REPAIRED.
- DENTS 1/4 IN. IN DIA BY 0.020 IN. DEPTH ARE CONSIDERED NEGLIGIBLE WHEN LOCATED ON SKIN LANDS, WHERE DOOR SEATS WITH SURROUNDING STRUCTURE.

S265-3-110

Negligible Damage Limits — Fuselage Structure
Figure 101 (Sheet 4 of 4)

MAIN FRAME

STRUCTURAL IDENTIFICATION

GENERAL

This section contains repair indexes for the fwd fuselage, intermediate fuselage and aft fuselage. Also refer to 53-00-00.

FORWARD FUSELAGE REPAIR INDEX

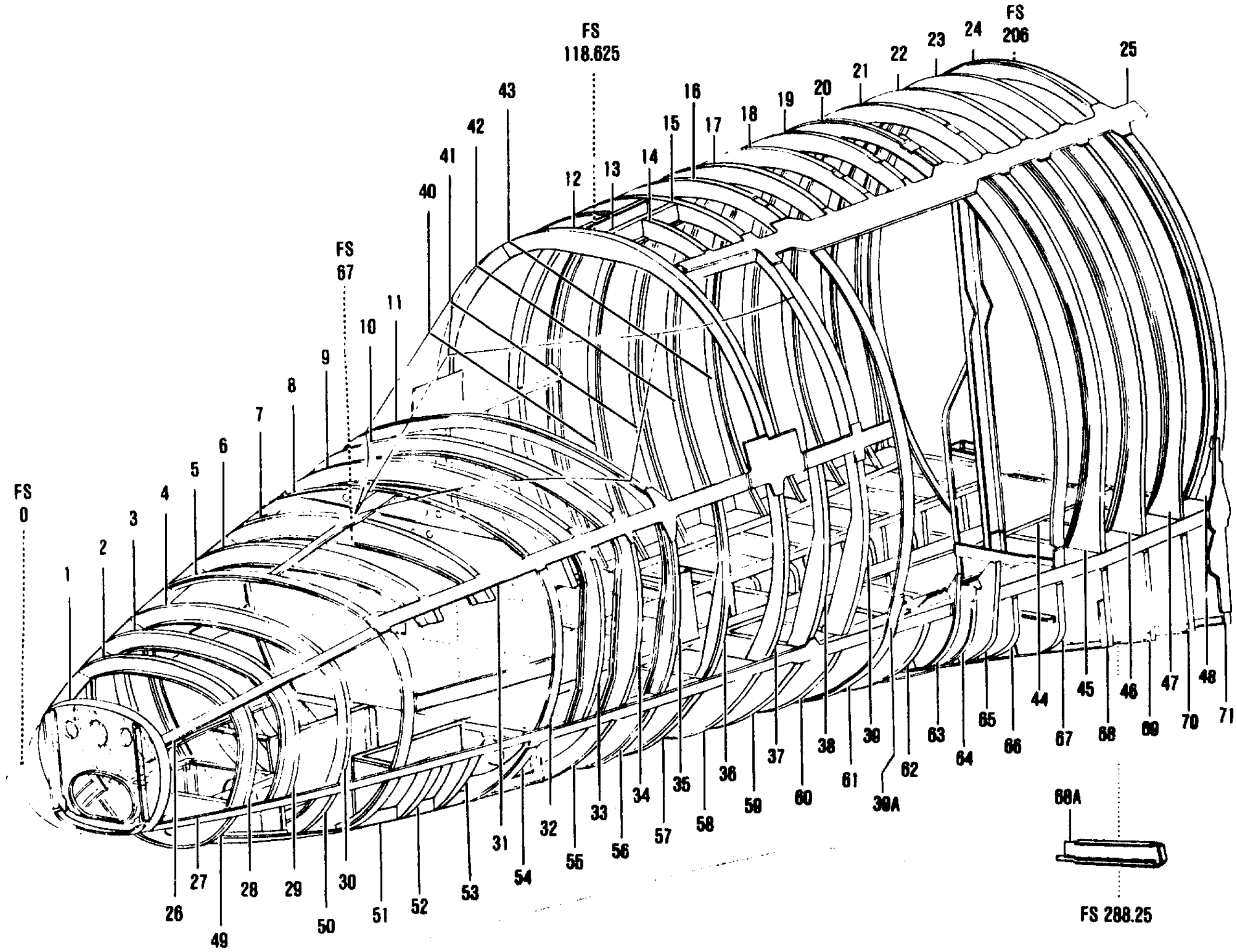
See figure 1 for model NA 265-40, -60, -60A, -60SC, and -65. See figure 2 for model NA 265-70, -80, -80A, and -80SC.

INTERMEDIATE FUSELAGE REPAIR INDEX

See figure 3 for model NA 265-40. See figure 4 for model NA 265-60, -60A, -60SC, and -65. See figure 5 for model NA 265-70, -80, -80A, and -80SC.

AFT FUSELAGE REPAIR INDEX

See figure 6 for model NA 265-40, -60, -60A, -60SC, and -65. See figure 7 for model NA 265-70, -80, -80A, and -80SC.

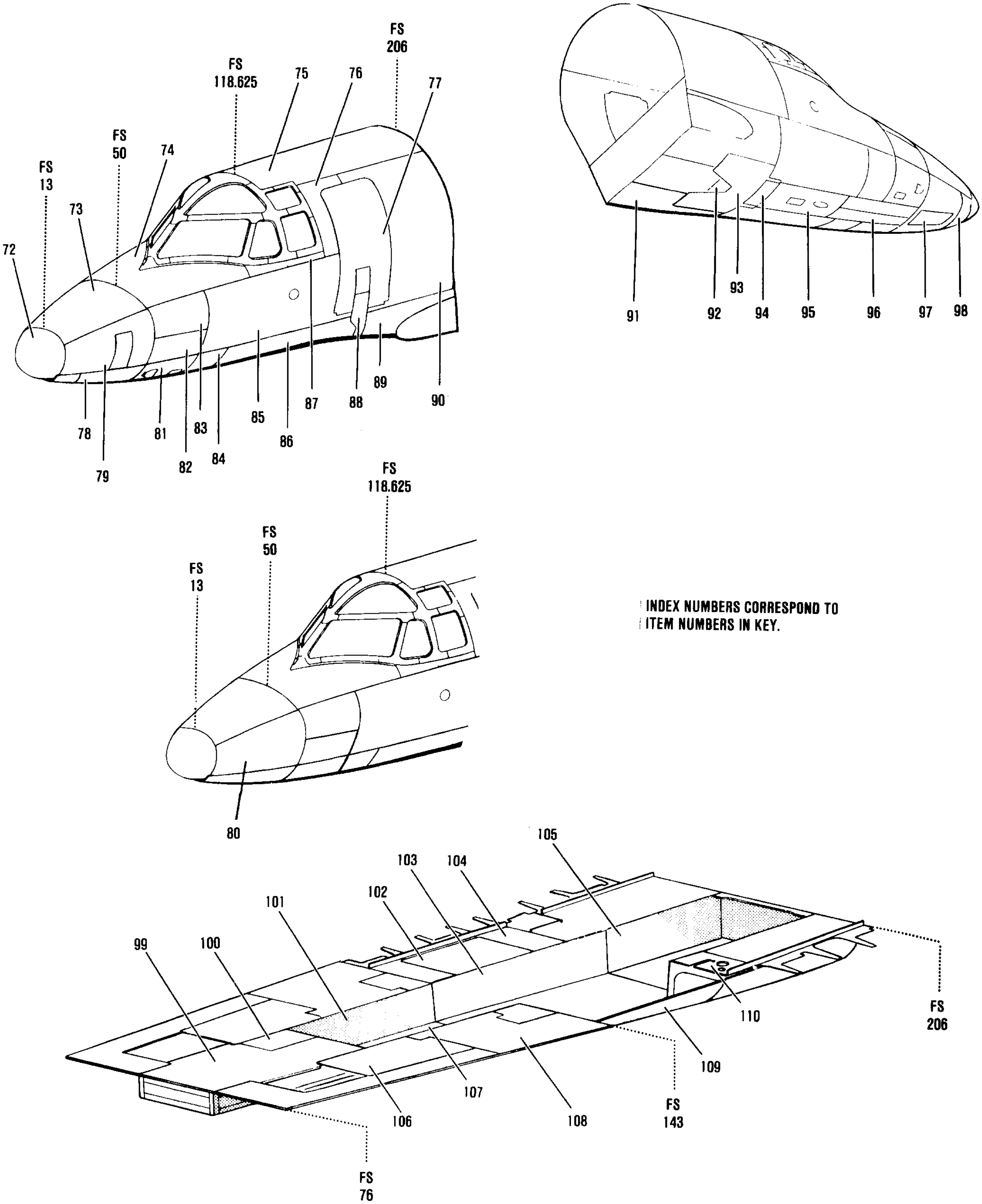


ASSEMBLY DRAWING NUMBERS FOR FWD FUSELAGE SECTION FOR MODEL NA 265-40, -60, -60A, -60SC AND -65

FRAME ASSEMBLY	265-311001
	465-311009
SIDE ASSEMBLY	265-311004
	265-311005
UPPER ASSEMBLY	265-311006
	265-318001
	265-318003
LOWER ASSEMBLY	265-311007
	265-311008
	265-311009
	265-311011

S265-3-111

Forward Fuselage Repair Index —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1 (Sheet 1 of 2)



Forward Fuselage Repair Index —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1 (Sheet 2 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-311013	Frame Assy — FS 13	7178-T6 Bare	0.025	
2	265-318023-15	Frame — Upper, FS 25.8	7178-T6 Bare	0.025	
3	265-318023-17	Frame — Upper, FS 33	7178-T6 Bare	0.025	
4	265-318023-19	Frame — Upper, FS 40.3	7178-T6 Bare	0.025	
5	265-311050	Bulkhead Assy — FS 50			
	265-311050-3	Web	7178-T6 Bare	0.020	
	265-311050-5, -7, and -9	Cap Angle	7178-T6 Extr	4E749	
6	265-318013	Frame — Upper, FS 58	7178-T6 Bare	0.025	53-10-20 Fig. 204
7	265-318014	Frame — Upper, FS 67	7178-T6 Bare	0.025	53-10-20 Fig. 204
8	265-318015	Bulkhead Assy — Upper, FS 76			
	265-318013,	Web	2024-T42 Bare	0.040	
	265-318015-7 and 8	Doublers	2024-T42 Bare	0.040	
9	265-318016	Frame — Upper, FS 83.5	7178-T6 Bare	0.032	
10	265-318017	Frame — Upper, FS 90.5	7178-T6 Bare	0.040	
11	265-318018	Frame — Upper, FS 98	7178-T6 Bare	0.100 A	
12	265-318057	Frame — Upper, FS 118.625			
	265-318057-3	Frame	7178-T6 Extr	6E1090	
	265-318057-5	Cap	7178-T6 Extr	6E1091	
13	265-318066	Beam — Upper, FS 118.625 to 134	7178-T6 Bare	0.040	
14	265-318064	Frame — Upper, FS 126.625	7178-T6 Bare	0.032	
15	265-318059	Frame — Upper, FS 134	7178-T6 Bare	0.090	
16	265-311144	Bulkhead Assy — FS 143			
	265-311144-9	Web	7178-T6 Bare	0.040	
	265-311144-3	Channel	7178-T6 Bare	0.063	
	265-311144-11	Angle	7178-T6 Bare	0.040	
17	265-311151	Frame — Upper, FS 150	7075-T6 Bare	0.032	
18	265-311159	Frame — Upper, FS 158.5	7075-T6 Bare	0.032	
19	265-311167	Frame — Upper, FS 166.25	7075-T6 Bare	0.032	
20	265-311175	Frame Assy — Upper, FS 174			
	265-311175-17	Frame	7178-T6 Bare	0.063	
	265-311175-13	Channel	7178-T6 Extr	2E489	
21	265-311183	Frame — Upper, FS 182	7178-T6 Bare	0.032	
22	265-311191	Frame — Upper, FS 190	7178-T6 Bare	0.032	
23	265-311199	Frame — Upper, FS 198	7178-T6 Bare	0.032	
24	265-312207	Frame — Upper, FS 206	7178-T6 Extr	3E95	
25	265-311283	Longeron — Upper, FS 118.625 to 211.25	7178-T6 Extr	4E682	
26	265-318020-3	Longeron — Forward, FS 13 to 50	7178-T6 Bare	0.040	53-10-20 Fig. 205
27	265-311281	Longeron Assy — Lower, FS 13 to 206			
	265-311281-3	Extrusion	7178-T6 Extr	4E735	
	265-311281-5	Extrusion	7178-T6 Extr	6E1085	
	265-311281-7	Web	7075-T6 Bare	0.063	
28	265-311025	Frame — Side, FS 25.8	7178-T6 Bare	0.032	
29	265-311033	Frame — Side, FS 33	7075-T6 Clad	0.040	
30	265-311040	Frame — Side, FS 40.3	7075-T6 Clad	0.040	
31	265-318020	Longeron — Side, FS 50 to 143	7178-T6 Bare	0.071 A	53-10-20 Fig. 207
32	265-311076	Bulkhead Assy — FS 76			
	265-311076-22 and -23	Cap Angle	7178-T6 Extr	4E643	
	265-311081	Web	2024-T3 Bare	0.050 A	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variation.*

Key to Figure 1 (Sheet 1 of 5)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
33	265-311083	Frame — Side, FS 83.5	7178-T6 Bare	0.032	
34	265-311090	Frame — Side, FS 90.5	7178-T6 Clad	0.032	
35	265-311098	Frame — Side, FS 98.2	7178-T6 Clad	0.063 A	
36	265-311108	Frame — Side, FS 108	7178-T6 Bare	0.063 A	
37	265-311118	Frame Assy — Side, FS 118			
	265-311118-3 and -4	Frame	7178-T6 Bare	0.063 A	
	265-311118-5 and -6	Cap Angle	7178-T6 Extr	2E489	
38	265-311126	Frame — Side, FS 126.625	7178-T6 Bare	0.032	
39	265-311134	Frame — Side, FS 134	7178-T6 Bare	0.090 A	
39A	265-311142	Frame — Side, FS 143	7178-T6 Bare	0.040 A	
40	265-311150	Frame — Side, RH, FS 150	7178-T6 Bare	0.032	
41	265-311158	Frame — Side, RH, FS 158.5	7178-T6 Bare	0.032	
42	265-311166	Frame — Side, RH, FS 166.25	7178-T6 Bare	0.032	
43	265-311174	Frame — Side, RH, FS 174	7178-T6 Extr	6E1115	53-10-20, Fig 202
44	265-311173	Bulkhead Assy — FS 174			
	265-311173-3	Web	7178-T6 Bare	0.025	
	265-311173-5	Web	7178-T6 Bare	0.050	
	265-311173-45	Web	7178-T6 Bare	0.032	
	265-311173-7	Cap Angle	7178-T6 Extr	4E697	
45	265-311182	Frame — Side, FS 182	7178-T6 Bare	0.032	
46	265-311190	Frame — Side, FS 190	7178-T6 Bare	0.040	
47	265-311198	Frame — Side, FS 198	7178-T6 Bare	0.032	
48	C 265-312206	Frame — Side, FS 206	7178-T6 Extr	3E96	
	B 306-312206	Frame — Side, FS 206			
49	265-311024	Frame — Lower, FS 25.8	7178-T6 Bare	0.032	
50	265-311011-14	Frame — LH Lower, FS 40.3	2024-T4 Bare	0.040	
	265-311045	Frame — RH Lower, FS 40.3			
51	265-311226	Beam — Nose Gear, FS 50 to 143			
	265-311226-3 and -4	Web	2024-T3 Bare	0.040	
	265-311226-55 and -56	Stringer — Center	7178-T6 Bare	78J	
	265-311226-57 and -58	Cap Angle — Lower	7178-T6 Extr	1E189	
	265-311226-61 and -62	Cap Angle — Upper	7178-T6 Extr	4E222	
52	C 265-311058	Frame — Lower, FS 58	7178-T6 Bare	0.025	
53	265-311067	Frame — Lower, FS 67	7178-T6 Bare	0.025	
54	265-311074	Frame Assy — LH Lower, FS 76			
	265-311074-3	Web	7178-T6 Bare	0.040	
	265-311074-5	Frame	7178-T6 Extr	4E743	
	265-311074-7	Angle	7178-T6 Bare	0.063	
	265-311075	Frame Assy — RH Lower, FS 76	7178-T6 Bare	0.040	
55	265-311089	Frame — Lower, FS 90.5	7178-T6 Bare	0.040	
56	265-311097	Frame Assy — Lower, FS 99			
	265-311097-17 and -18	Frame	7178-T6 Bare	0.050	
	265-311097-19 and -20	Angle	7178-T6 Extr	1E697	

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variations.

B For model NA 265-65

C Except for model NA 265-65

Key to Figure 1 (Sheet 2 of 5)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
57	265-311107	Frame Assy — Lower, FS 108			
	265-311107-3 and -4	Web	7178-T6 Bare	0.040	
	265-311107-13 and -14	Cap Angle — Outer	7178-T6 Bare	0.050	
	265-311107-15 and -16	Cap Angle — Upper	7178-T6 Bare	0.050	
58	265-311117	Frame Assy — Lower, FS 118.625			
	265-311117-3 and -4	Web	7178-T6 Bare	0.070 A	
	265-311117-5 and -6	Cap Angle	7178-T6 Extr	78J	
	265-311117-7 and -8	Stiffening Angle	7178-T6 Bare	0.051	
59	265-311125	Frame — Lower, FS 126.625	7178-T6 Bare	0.025	
60	265-311133	Frame Assy — Lower, FS 134			
	265-311133-5 and -6	Stiffening Angle	7178-T6 Extr	1E590	
	265-311133-7 and -8	Cap Angle — Lower	7178-T6 Bare	0.070	
	265-311133-11 and -12	Cap Angle — Upper	7178-T6 Extr	1E734	
	265-311133-19 and -20	Web	7178-T6 Bare	0.040	
61	265-311141	Bulkhead Assy — Lower, FS 143			
	265-311141-5	Cap Angle	7178-T6 Extr	4E315	
	265-311141-7	"T" Section — Stiffening	7178-T6 Extr	4E643	
	265-311141-27	Web	7178-T6 Bare	0.040	
62	265-311149	Frame — Lower, FS 150	7178-T6 Bare	0.032	
63	265-311155-5	Frame — Lower, FS 155.25	7178-T6 Bare	0.025	53-10-00, Fig 210
64	265-311157	Frame Assy — Lower, FS 158.5			
	265-311157-3	Web	7178-T6 Bare	0.032	53-10-00, Fig 210
	265-311157-9	Cap Angle	7178-T6 Bare	0.032	
	265-311157-15	Angle	7178-T6 Bare	0.040	
65 B	265-311155-3	Frame — Lower, FS 161.75	7178-T6 Bare	0.025	53-10-00, Fig 210
66	265-311168	Frame Assy — Lower, FS 166.25			53-10-00, Fig 214
	265-311168-3	Web	7178-T6 Bare	0.032	
	265-311168-5	Angle	7178-T6 Bare	0.040	
67	265-311178	Bulkhead Assy — Lower, FS 174			
	265-311171	Web — RH	7178-T6 Bare	0.063 A	
	265-311172	Web — LH	7178-T6 Bare	0.063 A	
	265-311178-3	Web	7178-T6 Bare	0.063 A	
	265-311178-15 and -25	Angle	7178-T6 Extr	78J	
	265-311178-19	Angle	7178-T6 Extr	4E222	
	265-311178-27	Angle	7178-T6 Bare	0.063	
68	265-311181	Frame — Lower, FS 182	7178-T6 Bare	0.032	
68A B	265-311187	Frame — Lower, FS 188.25	2024-T3 Bare	0.040	53-10-00, Fig 212
69	265-311189	Frame Assy — Lower, FS 190			
	265-311189-3 and -4	Web	7178-T6 Bare	0.032	
	265-311189-5 and -6	Cap Angle — Lower	7178-T6 Bare	0.040	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

B *Except for model NA 265-65.*

Key to Figure 1 (Sheet 3 of 5)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.		REPAIR FIGURE NO.
	265-311189-9 and -10	Doubler	7178-T6 Bare	0.032		
	265-311189-13 and -14	Stiffening Angle	7178-T6 Bare	0.040		
70	265-311197	Frame Assy — Lower, FS 198				
	265-311197-3 and -4	Web	7178-T6 Bare	0.032		
	265-311197-5 and -6	Cap Angle — Lower	7178-T6 Bare	0.040		
	265-311197-11 and -12	Channel	7178-T6 Bare	0.032		
71	265-312205	Frame Assy — Lower, FS 206				
	265-312205-3	Web	7178-T6 Bare	0.040		
	265-312205-5 and -6	Cap Angle — Outbd	7178-T6 Extr	4E746		
	265-312205-7	Cap Angle — Upper	7178-T6 Extr	4E511		
	265-312205-15 and -16	Cap Angle — Lower	7178-T6 Bare	0.063		
	265-312205-31	Stiffener	7178-T6 Bare	0.050		
72	265-300060	Nose Assy — Fuselage, FS 0 to 13				
	265-300019	Cover	Glass Fabric	0.010		
	265-540801	Window — Landing Light	Acrylic Sheet	0.125		
	B 282-300013	Nose Assy — Fuselage FS 0 to 13				
73	265-311205	Skin — Upper, FS 13 to 50	7178-T6 Bare	0.050	A	53-30-20, Fig 203
74	265-318010	Skin — Upper, FS 50 to 98	2024-T3 Bare	0.050	A	53-30-20, Fig 203
75	265-311212	Skin — Upper, FS 118.625 to 206	2024-T42 Bare	0.050	A	53-30-20, Fig 202
76	265-311184	Skin — Side, FS 134 to 158.5	2024-T3 Bare	0.050	A	53-30-20, Fig 202
77	265-300238	Skin — Entrance Door	2024-T3 Bare	0.050	A	53-30-20, Fig 202
78	265-311207	Skin — Lower, FS 13 to 50	7178-T6 Bare	0.050	A	53-30-20, Fig 203
79	265-311206	Skin — Side, FS 13 to 50	7178-T6 Bare	0.050	A	53-30-20, Fig 203
80	C 265-300062-11	Door Access, FS 13 to 50	7075-T6 Clad	0.050		
	D 380-300152-11	Door Access, FS 13 to 50				
	C VT11-388	Door Access, FS 13 to 50				
	C VT12-388	Door Access, FS 13 to 50				
81	265-311202	Skin — Side, FS 50 to 76	7178-T6 Bare	0.050	A	53-30-20, Fig 203
82	265-300033	Door — Access, Equipment	7178-T6 Bare	0.050	A	53-30-20, Fig 207
83	265-300034	Door — Navigational Equipment	7178-T6 Bare	0.050	A	53-30-20, Fig 207
84	265-300039	Door — Access	7178-T6 Bare	0.125	A	
85	265-311211	Skin — Side, FS 76 to 155.25	2024-T3 Bare	0.050	A	53-30-20, Fig 202
86	265-311218	Skin — Side, FS 91.44 to 159.25	2024-T42 Bare	0.050	A	53-30-20, Fig 203
87	265-318003	Skin — Side, FS 98 to 134	7178-T6 Bare	0.050	A	53-30-20, Fig 202
88	B 265-300209	Cover — Center Link, Entrance Door	7075-T6 Bare	0.125	A	
	D 265-300247	Cover — Center Link, Entrance Door				
89	B 265-311176	Skin — Lower, FS 161 to 206	7075-T6 Bare	0.050	A	53-30-20, Fig 203
	D 306-311767	Skin — Lower Sta 161 to 206				
90	265-311185	Skin — Side, FS 158.5 to 206	2024-T42 Bare	0.050	A	53-30-20, Fig 203
91	B 265-300046	Door — Lower, FS 190 to 206	7178-T6 Bare	0.050	A	53-30-20, Fig 203
	D 306-300041	Door — Lower, FS 190 to 206				
92	265-311204	Skin — Speed Brake Close-out	7178-T6 Bare	0.032		

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for applicable thickness.

B Except for model NA 265-65.

C For model NA 265-65 only.

D On model NA 265-60 (S/N 306-110 and subs) only, LH side.

Key to Figure 1 (Sheet 4 of 5)

STRUCTURAL IDENTIFICATION (Continued)

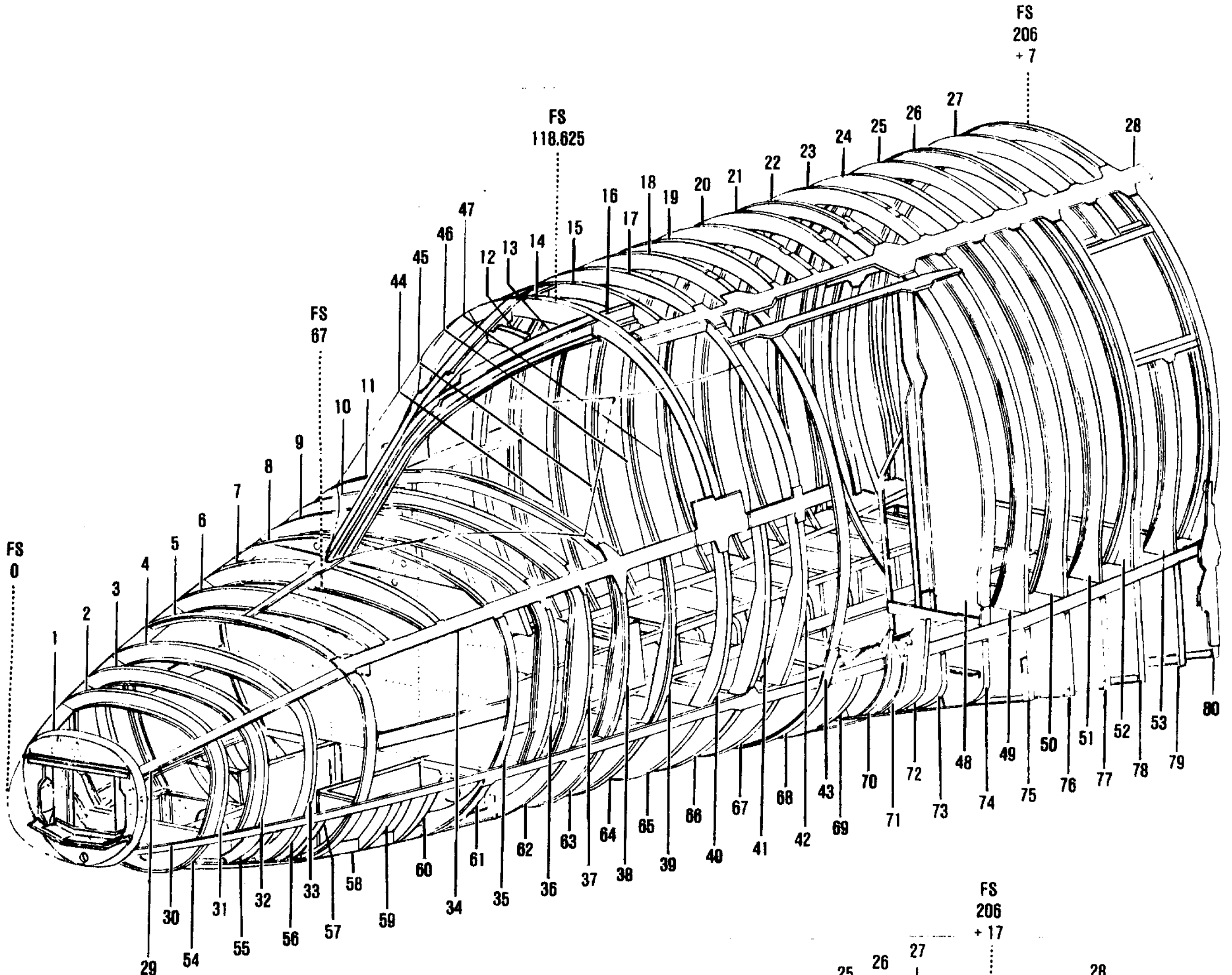
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
93	265-390003-3	Skin — Outer, Speed Brake	7178-T6 Bare	0.063	53-30-20, Fig 208
94	265-311220	Skin — Lower, Center FS 158.25 to 166.25	7178-T6 Bare	0.032	
95	265-311201	Skin — Lower, Center FS 102.813 to 151	7178-T6 Bare	0.050 A	
96	265-343301	Doors — Nose Gear	2024-T3 Bare	0.032	53-30-20, Fig 207
97	265-300016	Skin — Lower, Center, FS 25.75 to 50	7178-T6 Bare	0.050	53-30-20, Fig 203
98	265-311203	Skin — Lower, FS 16.250 to 25	Glass Fabric	0.010	
99	265-311261-3	Floor — Center, FS 76 to 108	2024-T4 Bare	0.040	
100	265-311261-31	Door — Fuselage Floor, FS 99 to 108	7178-T6 Bare	0.040	
101	265-311226	Beam Assy — FS 50 to 143			
	265-311226-3 and -4	Web	2024-T4 Bare	0.040	
	265-311226-55 and -56	Cap Angle — Upper	7178-T6 Extr	78J	
	265-311226-57 and -58	Cap Angle — Lower	7178-T6 Extr	1E189	
	265-311226-61 and -62	Stiffening Angle — Center	7178-T6 Extr	4E222	
102	265-300096	Door — Fuselage Floor, FS 150 to 167.125	7178-T6 Bare	0.032	
103	265-311230	Floor Assy — FS 143 to 174			
	265-311230-3	Web	7178-T6 Bare	0.032	
	265-311230-5	"T" Angle — Upper	7178-T6 Extr	6E1096	
	265-311230-7	Cap Angle — Lower	7178-T6 Extr	1E865	
	265-311230-17	Angle — Intermediate	7178-T6 Extr	1E859	
104	265-311266	Floor Assy — FS 143 to 206			
	265-311266-15	Web	7178-T6 Bare	0.040	
	265-311266-17	Web	7178-T6 Bare	0.025	
	265-311266-25	Door	7178-T6 Bare	0.025	
105	265-311232	Beam Assy — FS 174 to 206			
	265-311232-5	"T" Angle — Upper	7178-T6 Extr	4E737	
	265-311232-7	Angle — Intermediate	7178-T6 Extr	1E860	
	265-311232-23	Cap Angle — Lower	7178-T6 Bare	0.040	
	265-311232-25	Web	7178-T6 Bare	0.071 A	
106	265-300017	Door — Fuselage Floor, FS 98 to 118.625	7178-T6 Bare	0.025	
107	265-311264	Floor — Fuselage FS 108 to 143	7178-T6 Bare	0.040 A	
108	265-311262	Floor Assy — FS 76 to 143			
	265-311262-3 and -4	Web	7178-T6 Bare	0.032	
	265-311262-27 and -28	Door	7178-T6 Bare	0.040	
109	265-311271	Floor Assy — Side, FS 143 to 206			
	265-311271-3	Floor	2024-T3 Bare	0.040 A	
	265-311271-5 and -6	Floor	2024-T3 Bare	0.040 A	
110	265-311267	Floor Assy — FS 174 to 206			
	265-311267-3	Web	7178-T6 Bare	0.032	
	265-311267-5	Web	7178-T6 Bare	0.040	
	265-311267-7	Door	7178-T6 Bare	0.032	

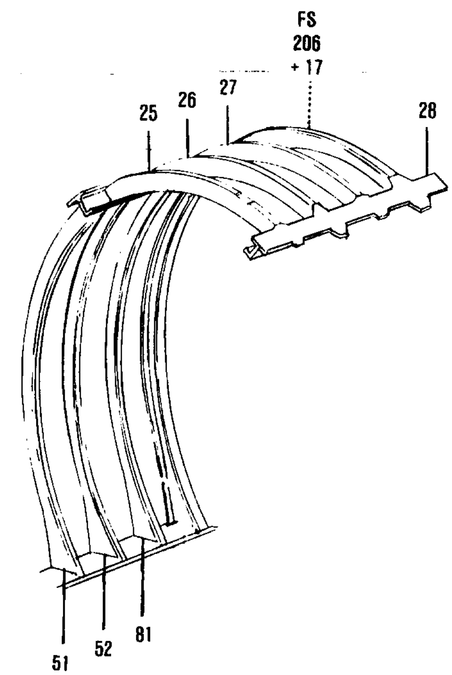
NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinend areas or refer to applicable drawing for thickness variation.

Key to Figure 1 (Sheet 5 of 5)





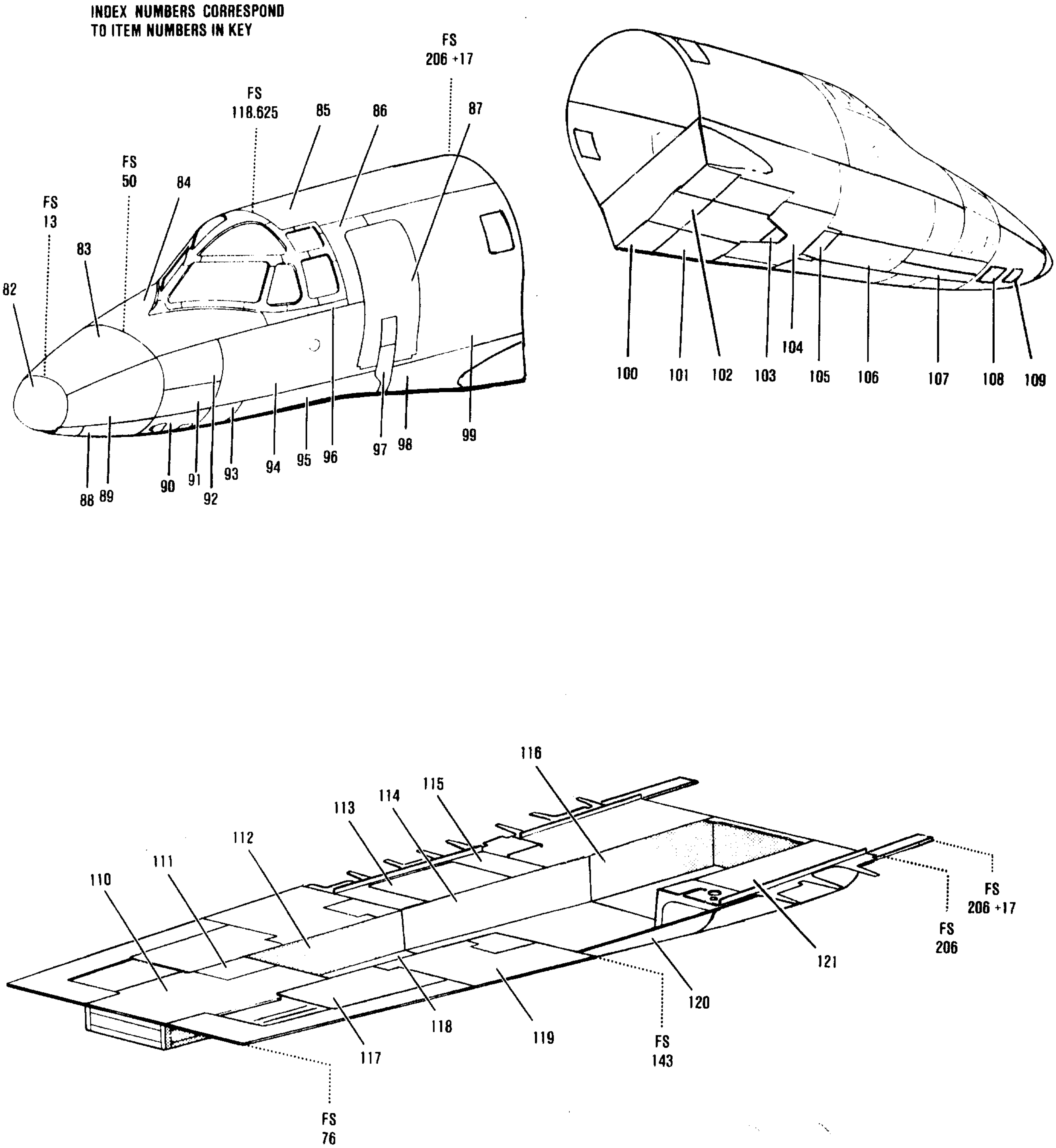
ASSEMBLY DRAWING NUMBERS FOR FWD FUSELAGE SECTION

FRAME ASSEMBLY	— 370-311001
SIDE ASSEMBLY	— 265-311003
	370-311004
	370-311005
UPPER ASSEMBLY	— 265-318003
LOWER ASSEMBLY	— 265-311007

INDEX NUMBERS CORRESPOND TO ITEM NUMBERS IN KEY

S370-3-25

Forward Fuselage Repair Index —
Model NA 265-70, -80, -80A, and -80SC
Figure 2 (Sheet 1 of 2)



Forward Fuselage Repair Index —
Model NA 265-70, -80, -80A, and -80SC
Figure 2 (Sheet 2 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-311013-59	Bulkhead — FS 13	7075-T6 Bare	0.032	
2	265-318023-15	Frame — Upper, FS 25.8	7178-T6 Bare	0.025	
3	265-318023-17	Frame — Upper, FS 33	7178-T6 Bare	0.025	
4	265-318023-19	Frame — Upper, FS 40.3	7178-T6 Bare	0.025	
5	265-311050	Bulkhead Assy — FS 50			
	265-311050-95	Web	7178-T6 Bare	0.025	
	265-311050-5	Cap Angle	7178-T6 Extr	4E749	
6	265-318013	Frame — Upper, FS 58	7178-T6 Bare	0.025	53-10-20, Fig 204
7	265-318014	Frame — Upper, FS 67	7178-T6 Bare	0.025	53-10-20, Fig 204
8	265-318015	Bulkhead Assy — FS 76			
	265-318015-15	Bulkhead	2024-T42 Bare	0.040	
	265-318015-3	Doublers	2024-T42 Bare	0.040	
9	265-318016	Frame — Upper, FS 83.5	7178-T6 Bare	0.032	
10	265-318017	Frame — Upper, FS 90.5	7178-T6 Bare	0.040	
11	265-318018	Frame — Upper, FS 98	7178-T6 Bare	0.100 A	
12	370-318052	Frame — Upper, FS 108	2024-T42 Bare	0.050	
13	370-318051	Beam — Cockpit, Upper	7178-T6 Bare	0.063	53-10-20, Fig 206
14	370-318057	Frame Assy — FS 118.625			
	370-318057-3	Frame	7178-T6 Extr	ST04395-211S0002	
	370-318057-5	Cap	7178-T6 Bare	0.063	
15	370-318064	Frame — Upper, FS 126.625	7178-T6 Bare	0.050	
16	370-318066	Beam — FS 118.625 to 126.625	7178-T6 Bare	0.063	
17	370-318059	Frame — Upper, FS 134	7178-T6 Bare	0.063	
18	370-311144	Bulkhead Assy FS 143			
	370-311144-3	Channel	7178-T6 Bare	0.063	
	370-311144-9	Web	7178-T6 Bare	0.040	
	370-311144-13	Angle	7178-T6 Bare	0.063	
19	370-311151	Frame — Upper, FS 150	7178-T6 Bare	0.050	
20	370-311159	Frame — Upper, FS 158.5	7178-T6 Bare	0.050	
21	370-311167	Frame — Upper, FS 166.25	7178-T6 Bare	0.050	
22	370-311175	Frame Assy — Upper, FS 174			
	370-311175-5	Frame	7178-T6 Extr	ST04385-21LS0002	53-10-20, Fig 202
	370-311175-7	Angle	7178-T6 Bare	0.090	
23	370-311183	Frame — Upper, FS 182	7178-T6 Bare	0.063	
24	370-311191	Frame — Upper, FS 190			
25	370-311199	Frame — Upper, FS 198	7178-T6 Bare	0.050	
26	370-312213	Frame — Upper, FS 206	7178-T6 Bare	0.080	
27	370-312225-3	Frame — Upper, FS 206 +9	7178-T6 Bare	0.063	
28	370-311283	Longeron — Upper, FS 118.625 to 206 +17	7178-T6 Extr	4E682	
29	265-318020-3	Longeron — Upper, FS 13 to 50	7178-T6 Bare	0.040	
30	265-311281	Longeron Assy — Lower, FS 13 to 206 +17			
	265-311281-3	Extrusion	7178-T6 Extr	4E735	
	265-311281-5	Extrusion	7178-T6 Extr	6E1085	
	265-311281-7	Web	7075-T6 Bare	0.063 A	
31	265-311025	Frame — Side, FS 25.812	7178-T6 Bare	0.032	
32	265-311033-9	Frame — Side, FS 33	7075-T6 Clad	0.040	
33	265-311040-5	Frame — Side, FS 40.3	7075-T6 Clad	0.040	
34	265-318020-63	Longeron Side, FS 50 to 143	7178-T6 Bare	0.040	

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

Key to Figure 2 (Sheet 1 of 4)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
35	265-311076	Bulkhead Assy — Side, FS 76			
	265-311076-21	Cap Angle	7178-T6 Extr	**4E643**	
	265-311081	Web	2024-T3 Bare	0.050	
36	265-311083	Frame — Side, FS 83.5	7178-T6 Bare	0.032	
37	265-311090	Frame — Side, FS 90.5	7178-T6 Bare	0.032	
38	265-311098	Frame — Side, FS 98.5	7178-T6 Bare	0.063	
39	265-311108	Frame — Side, FS 108	7178-T6 Bare	0.063	
40	265-311118	Frame Assy — Side, FS 118.625			
	265-311118-3	Frame	7178-T6 Bare	0.063	
	265-311118-5	Cap Angle	7178-T6 Extr	2E489	
41	265-311126	Frame — Side, FS 126.625	7178-T6 Bare	0.032	
42	370-318065	Frame — Side, FS 134	7178-T6 Bare	0.070	
43	265-311142	Bulkhead Assy — LH Side, FS 143	7178-T6 Bare	0.040	
	265-311143	Bulkhead Assy — RH Side, FS 143	7178-T6 Bare	0.040	
44	370-311150	Frame — RH Side, FS 150	7178-T6 Bare	0.063	
45	370-311158	Frame — RH Side, FS 158.5	7178-T6 Bare	0.063	
46	370-311166	Frame — RH Side, FS 166.25	7178-T6 Bare	0.063	
47	370-311174-3	Frame — RH Side, FS 174	7178-T6 Extr	6E1115	53-10-20, Fig 202
48	265-311173	Bulkhead Assy — Side, FS 174			
	265-311173-3	Web	7178-T6 Bare	0.025	
	265-311173-5	Web	7178-T6 Bare	0.050	
	265-311173-7	Cap Angle	7178-T6 Extr	4E697	
	265-311173-45	Web	7178-T6 Bare	0.032	
49	370-311182	Frame — Side, FS 182	7178-T6 Bare	0.063	
50	370-311190	Frame — Side, FS 190	7178-T6 Bare	0.063	
51	370-311198	Frame — Side, FS 198	7178-T6 Bare	0.063	
52	370-312206	Frame — Side, FS 206	7178-T6 Extr	2E490	
53	370-312209	Frame — Side, FS 206 +9	7178-T6 Bare	0.050	
54	265-311024-15	Frame — Lower, FS 25.8	7178-T6 Bare	0.032	
55	265-311035	Frame — Lower, FS 35.50	7075-T6 Bare	0.032	
56	265-311045	Frame — Lower, FS 40.3	7075-T6 Bare	0.032	
57	265-311044	Frame — Lower, FS 43.625	7075-T6 Bare	0.032	
58	265-311226	Beam Assy — FS 50 to 143			
	265-311226-139	Web	2024-T6 Bare	0.040	
	265-311226-61	Stringer	7178-T6 Extr	4E222	
	265-311226-55	Upper Cap	7178-T6 Extr	78J	
	265-311226-57	Lower Cap	7178-T6 Extr	1E189	
59	265-311058-4	Frame — Lower, FS 58	7178-T6 Bare	0.040	
60	265-311067	Frame — Lower, FS 67	7178-T6 Bare	0.040	
61	265-311074	Frame Assy — Lower, FS 76			
	265-311074-23	Web	7178-T6 Bare	0.050	
	265-311074-5	Frame	7178-T6 Extr	4E743	
	265-311074-7	Angle	7178-T6 Bare	0.063	
62	265-311089	Frame — Lower, FS 90.5	7178-T6 Bare	0.063	
63	265-311097	Frame Assy — Lower, FS 98			
	265-311097-17	Frame	7178-T6 Bare	0.050	
	265-311097-19	Angle	7178-T6 Extr	1E697	
64	265-311107	Frame Assy — Lower, FS 108			
	265-311107-3	Web	7178-T6 Bare	0.040	
	265-311107-7	Upper Angle	7178-T6 Extr	1E734	
	265-311107-13	Outer Cap	7178-T6 Bare	0.050	
65	265-311117	Frame Assy — Lower, FS 118.625			
	265-311117-3	Web	7178-T6 Bare	0.071	
	265-311117-5	Cap Angle	7178-T6 Extr	78J	
	265-311117-9	Stiffening Angle	7178-T6 Bare	0.090	

NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 2 (Sheet 2 of 4)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
66	265-311125	Frame — Lower, FS126.625	7178-T6 Bare	0.025	
67	265-311133	Frame Assy — Lower, FS 134			
	265-311133-5	Stiffening Angle	7178-T6 Bare	1E590	
	265-311133-7	Lower Cap Angle	7178-T6 Bare	0.070	
	265-311133-11	Upper Cap Angle	7178-T6 Bare	1E734	
	265-311133-19	Web	7178-T6 Bare	0.040	
68	265-311141	Bulkhead Assy — Lower, FS 143			
	265-311141-5	Cap Angle	7178-T6 Extr	4E315	
	265-311141-7	Stiffening Angle	7178-T6 Extr	4E643	
	265-311141-27	Web	7178-T6 Bare	0.040	
69	265-311149-15	Frame — Lower FS 150	7178-T6 Bare	0.063	
70	265-311155-5	Frame — Lower FS 155.25	7178-T6 Bare	0.032	53-10-20 Fig. 210
71	265-311157	Frame Assy — Lower FS 158.5			53-10-20 Fig. 210
	265-311157-37	Web	7178-T6 Bare	0.063 **A**	
	265-311157-15	Angle	7178-T6 Bare	0.040	
72	265-311155-3	Frame — Lower FS 161.75	7178-T6 Bare	0.032	53-10-20 Fig. 210
73	265-311168	Frame Assy — Lower FS 166.25			53-10-20, Fig 214
	265-311168-3	Web	7178-T6 Bare	0.032	
	265-311168-5	Angle	7178-T6 Bare	0.040	
74	265-311178	Bulkhead Assy — Lower, FS 174			
	265-311112-57	Web	7178-T6 Bare	0.063	
	265-311112-67	Angle — Lower	7178-T6 Extr	1E697	
	265-311178-19	Angle — Upper	7178-T6 Extr	78J	
	265-311178-7	Angle — Upper Center	7178-T6 Extr	1E751	
75	265-311181	Frame — Lower, FS 182	7178-T6 Bare	0.032	
76	265-311189	Frame Assy — Lower, FS 190			
	265-311189-3	Web	7178-T6 Bare	0.032	
	265-311189-63	Cap Angle — Lower	7178-T6 Bare	0.063	
	265-311189-9	Doublers	7178-T6 Bare	0.032	
	265-311189-13	Stiffening Angles	7178-T6 Bare	0.040	
77	265-311197	Frame Assy — Lower, FS 198			
	265-311197-3	Web	7178-T6 Bare	0.032	
	265-311197-27	Lower Cap	7178-T6 Bare	0.063	
	265-311197-53	Channel	7178-T6 Bare	0.032	
78	370-311205	Frame Assy — Lower, FS 206			
	370-311205-3	Web	2024-T42 Bare	0.040	
	370-311205-10	Cap Angle — Outbd	7075-T6 Extr	4E117	
	370-311205-7	Cap Angle — Upper	7075-T6 Extr	4E117	
	370-311205-15	Cap Angle — Lower	7178-T6 Bare	0.070	
	370-311205-19	Stiffener	7178-T6 Extr	AND10133-0701	
79	370-312211	Frame Assy — Lower, FS 206 +9			
	370-312211-3	Web	7178-T6 Bare	0.032	
	370-312211-5	Upper Cap	7178-T6 Extr	AND10133-0702	
	370-312211-7	Intermediate Angle	7178-T6 Extr	AND10122-0702	
	370-312211-19	Lower Cap	7178-T6 Extr	AND10133-0701	
80	370-312214	Frame Assy — Lower, FS 206 +17			
	370-312214-3	Web	7178-T6 Bare	0.040	
	370-312214-7	Upper Angle	7178-T6 Extr	4E611	
	370-312214-15	Lower Cap	7178-T6 Bare	0.063	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

Key to Figure 2 (Sheet 3 of 4)

STRUCTURAL IDENTIFICATION (Continued)

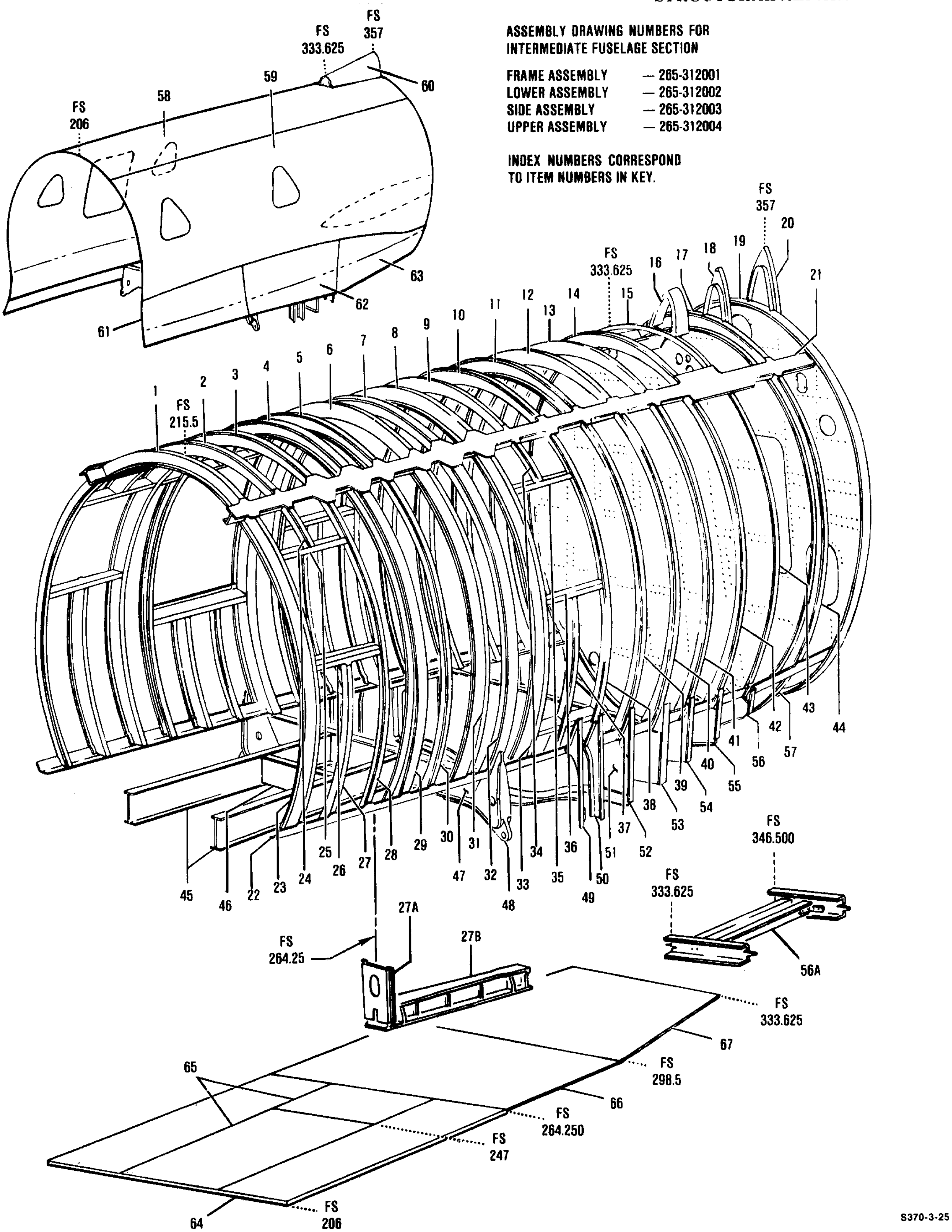
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
81	370-312208	Frame — FS 206 +9 (RH)	7178-T6 Bare	0.050	
82	282-300013	Nose Assy — FS 0 to 13	Glass Fabric	0.010	
83	265-311205	Skin — Upper, FS 13 to 50	7178-T6 Bare	0.050 A	53-30-20 Fig. 206
84	265-318010	Skin — Upper, FS 50 to 98	2024-T3 Bare	0.050 A	53-30-20 Fig. 206
85	370-311212	Skin — Upper, FS 118.625 to 206+17	2024-T42 Bare	0.050 A	53-30-20 Fig. 202
86	370-311184	Skin — Side, FS 134 to 158.5	2024-T42 Bare	0.050 A	53-30-20 Fig. 202
87	265-300238-3	Skin — Entrance Door	2024-T3 Bare	0.050 A	53-30-20 Fig. 202
88	265-311207	Skin — Lower, FS 13 to 50	7178-T6 Bare	0.050 A	53-30-20 Fig. 206
89	265-311206	Door — Side, FS 13 to 50	7178-T6 Bare	0.050 A	53-30-20 Fig. 206
90	265-311202	Skin — Side, FS 50 to 76	7178-T6 Bare	0.050 A	53-30-20 Fig. 206
91	265-300033	Door — Equipment Access	7178-T6 Bare	0.050 A	53-30-20 Fig. 207
92	265-300034	Door — Equipment Access	7178-T6 Bare	0.050 A	53-30-20 Fig. 207
93	265-300039	Door — FS 76 - 90	7178-T6 Bare	0.125 A	
94	265-311211	Skin — Side, FS 76 to 155.25	2024-T3 Bare	0.050 A	53-30-20 Fig. 202
95	265-311218	Skin — Lower, FS 91.44 to 159.25	2024-T3 Bare	0.050 A	53-30-20 Fig. 206
96	265-318003	Skin — Side, FS 98 to 134	7178-T6 Bare	0.050 A	53-30-20 Fig. 202
97	265-300247	Cover — Center Link, Entry Door	2024-T42 Bare	0.190 A	
98	306-311176	Skin — Lower, FS 161 to 206	2024-T3 Bare	0.050 A	53-30-20 Fig. 206
99	370-311185	Skin — Side, FS 158.5 to 206 +17	2024-T42 Bare	0.050 A	53-30-20 Fig. 206
100	370-300042	Door — FS 206 to 206 +17	2024-T42 Bare	0.050	
101	306-300041	Door — FS 190 to 206	2024-T42 Bare	0.050	
102	370-312108-21	Door — FS 206 to 206 +17	2024-T42 Bare	0.050	
103	265-311204	Skin — Speed Brake Closeout	7178-T6 Bare	0.032	
104	265-390003	Speed Brake	7178-T6 Bare	0.063	53-30-20 Fig. 208
105	265-300043	Door — FS 150 to 158.5	7178-T6 Bare	0.050 A	
106	265-311201	Skin — FS 102.813 to 151	7178-T6 Bare	0.050	
107	265-343301	Door — Nose Gear	2024-T42 Clad	0.032	53-30-20 Fig. 207
108	282-300120	Door — Landing Light	2024-T42 Clad	0.071	
109	282-300119	Door — FS 24.625 to 35.5	6061-T4 Bare	0.050	
110	265-311261-151	Floor — Center, FS 76 to 108	2024-T4 Bare	0.040	
111	265-311261-61	Door — Fuselage Floor, FS 99 to 108	7178-T6 Bare	0.040	
112	265-311226-411	Beam Assy — FS 50 to 143	2024-T42 Bare	0.040	
113	265-300096	Door — Fuselage Floor, FS 150 to 167-1/8	7178-T6 Bare	0.032	
114	265-311230	Floor Assy — FS 143 to 174	7178-T6 Bare	0.032	53-20-20 Fig. 201
115	265-311266-131	Floor Assy — FS 143 to 206	7178-T6 Bare	0.040	53-20-20 Fig. 201
116	265-311232	Beam — FS 174 to 206	7178-T6 Bare	0.071	
117	265-311266	Door Assy — FS 98 to 118.625	7178-T6 Bare	0.025	
118	265-311264	Floor Assy — FS 108 to 143	7178-T6 Bare	0.040	53-20-20 Fig. 201
119	265-311262-3	Floor Assy — FS 76 - 143	7178-T6 Bare	0.032	53-20-20 Fig. 201
120	265-311271	Floor Assy — FS 143 to 206	7178-T6 Bare	0.040	53-20-20 Fig. 201
121	265-311267-7	Floor Assy — FS 174 to 206	7178-T6 Bare	0.040	53-20-20 Fig. 201

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

Key to Figure 2 (Sheet 4 of 4)



Intermediate Fuselage Repair Index — Model NA 265-40
Figure 3

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-312216	Frame — Upper, FS 215.5	7178-T6 Bare	0.080	
2	265-312225	Frame — Upper, FS 224.5	7178-T6 Bare	0.032	53-20-20, Fig 204
3	277-312234	Frame — Upper, FS 233.5	7178-T6 Extr	6E1163	
4	277-312243	Frame — Upper, FS 242	7178-T6 Extr	2E490	53-10-20, Fig 203
5	265-312250	Frame — Upper, FS 249.125	7178-T6 Bare	0.032	
6	265-312258	Frame — Upper, FS 257.562	7178-T6 Bare	0.032	
7	265-312265	Frame — Upper, FS 264.25	7178-T6 Extr	2E491	53-10-20, Fig 203
8	265-312273	Frame — Upper, FS 272.5	7178-T6 Extr	6E1092	53-10-20, Fig 201
9	265-312282-3	Frame — Upper, FS 281	7178-T6 Bare	0.032	
10	265-312290	Frame — Upper, FS 289.5	7178-T6 Bare	0.080	
11	265-312282-5	Frame — Upper, FS 298.5	7178-T6 Bare	0.032	
12	265-312308	Frame — Upper, FS 307.250	7178-T6 Bare	0.063	
13	265-312282-7	Frame — Upper, FS 316	7178-T6 Bare	0.032	
14	265-312282-9	Frame — Upper, FS 324.75	7178-T6 Bare	0.032	
15	265-312337	Frame — Upper, FS 333.625	7178-T6 Extr	1E861	
16	265-931337	Frame — Leading Edge FS 333.625	Molded Glass Fibre Reinforced Phenolic		
17	265-313345	Frame — Upper, FS 346.5	7178-T6 Bare	0.032	53-10-20, Fig 203
18	265-313007-11	Frame — Dorsal Fin, FS 346.5	7178-T6 Bare	0.025	
19	265-312357	Bulkhead Assy — FS 357			
	265-312357-169	Extrusion — Web Cap	7178-T6 Extr	4E750	
	265-312357-61	Extrusion — "T" Stiffener	7178-T6 Extr	4E222	
	265-312357-75	Web	7178-T6 Bare	0.020	
	265-312357-55	Support Angles	7178-T6 Bare	0.025	
	265-312357-77	Doublers	7178-T6 Bare	0.032	
	265-312357-89	Pan	7178-T6 Bare	0.040	
	265-312357-37	Strap	7178-T6 Bare	0.050	
	265-312357-11	Channel	7178-T6 Bare	0.063	
	265-312357-91	Frame	7075-T6 Clad	0.040	
	265-312357-109	Zee	7075-T6 Bare	0.025	
	265-312357-133	Doublers	7075-T6 Bare	0.032	
	265-312357-120	Channel	7075-T6 Bare	0.040	
	265-312357-115	Zee	7075-T6 Bare	0.063	
20	265-313007-9	Frame — Dorsal Fin, FS 357	7178-T6 Bare	0.025	
21	265-312035	Longeron — Upper	7178-T6 Extr	4E682	
22	265-312036	Longeron — Lower	7178-T6 Extr	4E699	
23	265-312215	Frame — Side, FS 215.5	7178-T6 Bare	0.080 [A]	
24	265-312223	Frame — Side, Upper, FS 224.5	7178-T6 Bare	0.032	
25	265-312003-9	Intercostal — FS 215.5 to 233.5	7178-T6 Bare	0.040	
26	265-312003-7	Intercostal — FS 215.5 to 233.5	7178-T6 Bare	0.040	
27	265-312224	Frame — Side, Lower, FS 224.5	7178-T6 Bare	0.050	
27A	265-312266	Support — FS 264.25	7178-T6 Bare	0.071	53-40-20, Fig 202
27B	265-312040	Beam — FS 264.25 to 298.460	7178-T6	Bar	53-40-20, Fig 202
28	265-312231	Frame — Side RH, FS 233.5	7178-T6 Extr	6E1008	
	265-312233	Frame — Side LH, FS 233.5	7178-T6 Extr	6E1008	
	265-312233-5	Strap	7178-T6 Bare	0.190	
	265-312233-7	Strap	7178-T6 Bare	0.062	

NOTES

- For additional repairs, refer to 51-70-00.

[A] This is a chem-milled part. Measure skin thickness or refer to applicable drawing numbers for thickness variation.

Key to Figure 3 (Sheet 1 of 4)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
29	265-312241	Frame — Side, RH, FS 242	7178-T6 Extr	2E486	
	265-313242	Frame — Side, LH, FS 242	7178-T6 Extr	2E485	
30	265-312246	Frame — Side, RH Lower, FS 249.125	7178-T6 Bare	0.040	
	265-312249	Frame — Side, LH, FS 249.125	7178-T6 Bare	0.050 A	
31	265-312254	Frame — Side, RH Lower, FS 257.562	7178-T6 Bare	0.040	
	265-312257	Frame — Side, LH, FS 257.562	7178-T6 Bare	0.050 A	
32	265-312264	Frame — Side, FS 264.25	7178-T6 Extr	2E450	
33	265-312270	Frame — Side, RH, FS 272.5	7178-T6 Extr	6E1008	
	265-312272	Frame — Side, LH, FS 272.5	7178-T6 Extr	6E1008	
	265-312272-3	Strap	7178-T6 Bare	0.190	
	265-312272-5	Strap	7178-T6 Bare	0.063	
34	265-312280	Frame — Side, Upper, FS 281	7178-T6 Bare	0.032	
35	265-312003-9	Intercostal — FS 275.5 to 289.5	7178-T6 Bare	0.040	
36	265-312003-7	Intercostal — FS 275.5 to 289.5	7178-T6 Bare	0.040	
37	265-312281	Frame — Side, Lower FS 281	7178-T6 Bare	0.050	
			7075-T6 Extr	AND 10134-0702	
38	265-312289	Frame — Side, FS 289.5	7178-T6 Bare	0.080 A	
39	265-312298	Frame — Side, FS 298.5	7178-T6 Bare	0.040	
40	265-312307	Frame — Side, FS 307.250	7178-T6 Extr	6E1114	
41	265-312316	Frame — Side, FS 316	7178-T6 Bare	0.040	
42	265-312324	Frame — Side, FS 324.750	7178-T6 Bare	0.040	
43	265-312336	Bulkhead Assy — FS 333.625			
	265-312336-73 -75, -77, and -79	Channels	7178-T6 Bare	0.025	
	265-312336-29	Angle	7178-T6 Bare	0.040	
	265-312336-97	Doubler	7178-T6 Bare	0.050	
	265-312336-57	Shim	7178-T6 Bare	0.063	
	265-312336-25 and -27	Channels	7178-T6 Bare	0.071	
	265-312336-33	Hat Section	7178-T6 Clad	0.032	
	265-312336-37	Shim	7178-T6 Clad	0.040	
	265-312336-35	Strap	7178-T6 Clad	0.063	
	265-312336-62, -63. -65, -67, and -68	Hat Section	7075-T6 Bare	0.025	
	265-312336-71	Web	2024-T42 Bare	0.032	
	265-312336-97	Doubler	2024-T42 Bare	0.050	
44	265-313344	Frame — Side, FS 346.5	2024-T42 Bare	0.025	53-10-20, Fig 203
45	265-312041	Beam Assy — FS 206 to 264.25			
	265-312041-5	Cap — Upper	7178-T6 Extr	4E742	
	265-312041-7 and -8	Cap — Lower	7178-T6 Extr	4E753	
	265-312041-3 and -4	Web	7178-T6 Bare	0.080 A	
46	265-312042	Beam — Floor Support, FS 247			
	265-312042-5	Cap Angle	7178-T6 Extr	4E742	
	265-312042-3	Web	7178-T6 Bare	0.032	

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

Key to Figure 3 (Sheet 2 of 4)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
47	265-312263	Frame — Lower, FS 264.25			
	265-312263-5	Cap Angle	7178-T6 Extr	4E741	
	265-312263-7	Cap Angle	7178-T6 Extr	4E742	
	265-312263-3	Web	7178-T6 Bare	0.100 A	
48	265-312260-1 and -2	Fitting — Wing Attach, FS 264.312	7075-T6 A1 Alloy	2.750	
	282-312262-5 and -6		7075-T651 Bare	2.500	
49	265-312284	Support — Fillet, FS 284.437	7178-T6 Bare	0.063	
50	265-312288	Support — Fillet, FS 289.5	7178-T6 Bare	0.063	
51	265-312297	Frame — Lower, FS 298.5			
	265-312297-3	Web	7178-T6 Bare	0.032	
	265-312297-27	Channel	7178-T6 Bare	0.071 A	
	265-312297-5	Cap Angle	7178-T6 Extr	4E742	
52	265-312296	Support — Fillet, FS 298.5	7178-T6 Bare	0.050	
53	265-312306	Frame — Lower, FS 307.25			
	265-312306-3	Web	7178-T6 Bare	0.040	
	265-312306-5	Angle	7178-T6 Bare	0.050	
54	265-312315	Frame — Lower, FS 316			
	265-312315-3	Web	7178-T6 Bare	0.025	
	265-312315-5	Angle	7178-T6 Bare	0.050	
55	277-312323	Frame — Lower, FS 324.75			
	277-312323-13	Web	7075-T6 Bare	0.040	
	277-312323-5	Cap	7178-T6 Bare	0.063	
56	265-312335	Frame — Lower, FS 333.625	7178-T6 Bare	0.032	
56A	265-312002-65	Support — UHF Antenna	7178-T6 Bare	0.063	
57	265-313343	Frame — Lower, FS 346.5	7178-T6 Bare	0.032	53-10-20 Fig. 203
58	265-312015	Skin — Upper, FS 206 to 357	2024-T3 Bare	0.050 A	53-10-20 Fig. 202
59	265-312016	Skin — Side, FS 206 to 357	2024-T3 Bare	0.050 A	53-10-20 Fig. 202
60	265-313007	Skin — Dorsal Fin, FS 333.625 to 357	7178-T6 Bare	0.032	
61	265-300501	Skin — Lower, FS 206 to 258.437	2024-T3 Bare	0.050	53-10-20 Fig. 201
62	265-312018	Skin — Lower, FS 257.437 to 308.125	7178-T6 Bare	0.050 A	53-10-20 Fig. 202
63	265-312021	Skin — Lower, FS 308.125 to 357	2024-T3 Bare	0.050 A	53-10-20 Fig. 202
64	265-312007	Floor Assy — Side, FS 206 to 264.250			53-10-20 Fig. 201
	265-312007-3	Facing Sheet — Upper	7178-T6 Bare	0.016	
	265-312007-5	Facing Sheet — Lower	7178-T6 Bare	0.016	
	265-312007-7	Core	5052-H39 Honeycomb	1/8x0.0015	
	265-312007-9, -10, -11, -12, -13, -14, -15, and -16	Zee	7178-T6 Extr	6E1097	
65	265-312005	Floor Assy — Center, FS 206 to 264.250			53-10-20 Fig. 201
	265-312005-3	Facing Sheet — Upper	7178-T6 Bare	0.016	
	265-312005-5	Facing Sheet — Lower	7178-T6 Bare	0.016	
	265-312005-7	Core	5052-H39 Honeycomb	1/8 x 0.0015	
	265-312005-9, -13, -15, and -16	Zee	7178-T6 Extr	6E1047	
66	265-312006	Floor Assy — FS 264.25 to 298.5			53-10-20 Fig. 201
	265-312006-3	Facing Sheet — Upper	7178-T6 Bare	0.032	

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.***

Key to Figure 3 (Sheet 3 of 4)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
	265-312006-5	Facing Sheet — Lower	7178-T6 Bare	0.025	
	265-312006-7 and -8	Core	5052-H39 Honeycomb	1/8 x 0.002	
	265-312006-17 and -18	Zee	7178-T6 Extr	5E437	
	265-312006-9 and -11	Angles	7178-T6 Extr	1E821	
	265-312006-13 and -15	Angles	2024-T42 Clad	0.040	
67	265-312151	Floor Assy — FS 298.5 to 333.625	2024-T3 Bare	0.040	53-20-20, Fig 202

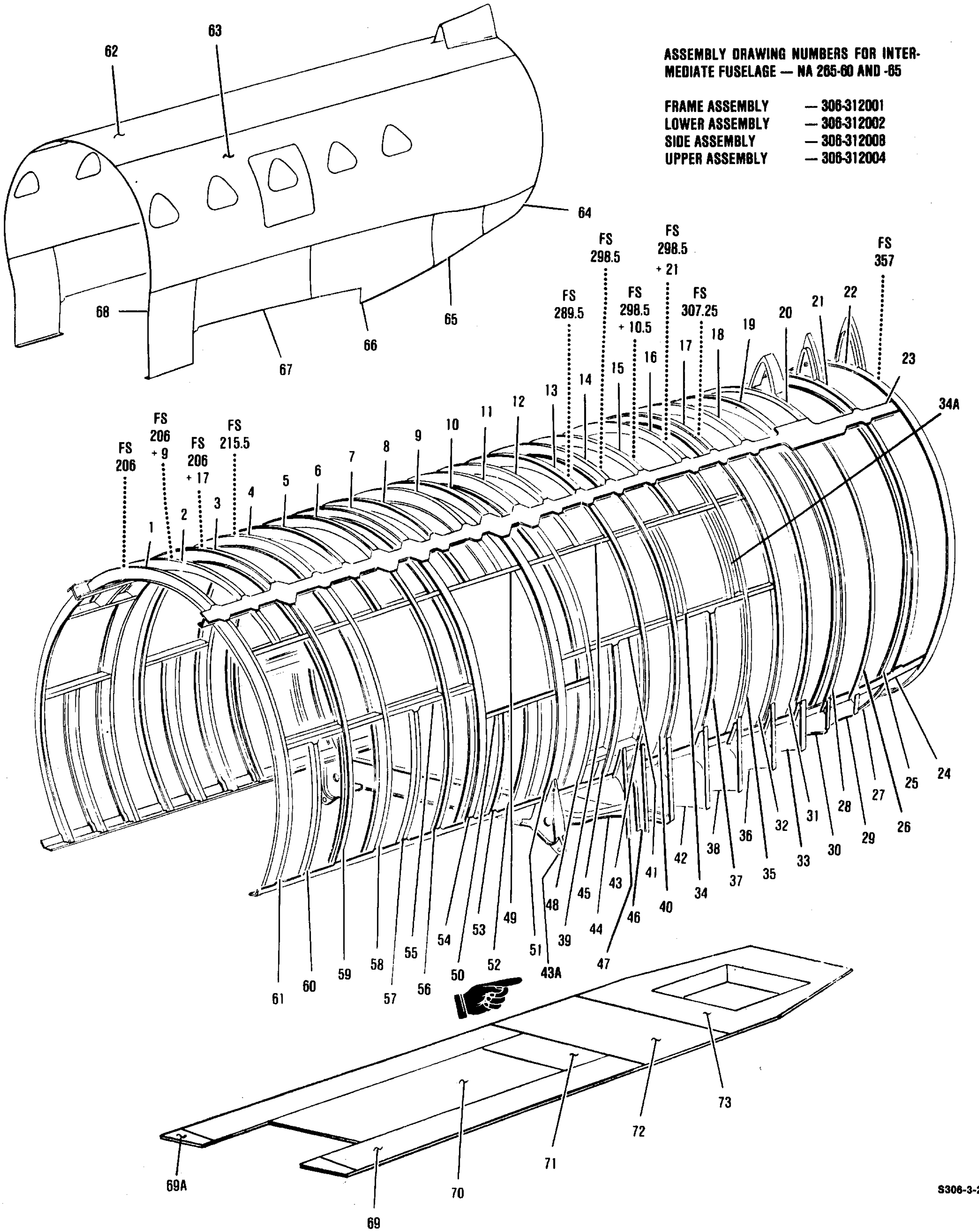
NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 3 (Sheet 4 of 4)

ASSEMBLY DRAWING NUMBERS FOR INTERMEDIATE FUSELAGE — NA 265-60 AND -65

FRAME ASSEMBLY	— 306-312001
LOWER ASSEMBLY	— 306-312002
SIDE ASSEMBLY	— 306-312008
UPPER ASSEMBLY	— 306-312004



Intermediate Fuselage Repair Index — Model NA 265-60, -60A, -60SC, and -65
Figure 4

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	306-312207	Frame — Upper, FS 206	7178-T6 Extr	2E485	
2	306-312210	Frame — Upper, FS 206 +9	7178-T6 Bare	0.032	
3	306-312212	Frame — Upper, FS 206 +17	7178-T6 Bare	3E96	
4	265-312216	Frame — Upper, FS 215.5	7178-T6 Bare	0.080	
5	265-312225	Frame — Upper, FS 224.5	7178-T6 Bare	0.032	53-10-20 Fig. 201
6	265-312234	Frame — Upper, FS 233.5	7178-T6 Extr	6E1163	
7	265-312243	Frame — Upper, FS 242	7178-T6 Extr	2E490	53-10-20 Fig. 201
8	265-312250	Frame — Upper, FS 249.125	7178-T6 Bare	0.032	
9	265-312258	Frame — Upper, FS 257.562	7178-T6 Bare	0.032	
10	265-312265	Frame — Upper, FS 264.25	7178-T6 Extr	2E491	53-10-20 Fig. 201
11	265-312273	Frame — Upper, FS 272.5	7178-T6 Bare	6E1092	
12	265-312282	Frame — Upper, FS 281	7178-T6 Bare	0.032	
13	265-312290	Frame — Upper, FS 289.5	7178-T6 Bare	0.032	
14	306-312305	Frame — Upper, FS 298.5	7178-T6 Bare	0.080	
15	306-312297	Frame — Upper, FS 298.5 +10.5	7178-T6 Bare	0.032	
16	306-312304	Frame — Upper, FS 298.5 +21	7178-T6 Bare	0.080	
17	265-312308	Frame — Upper, FS 307.250	7178-T6 Bare	0.063	
18	265-312282	Frame — Upper, FS 316	7178-T6 Bare	0.032	
19	265-312282	Frame — Upper, FS 324.75	7178-T6 Bare	0.032	
20	265-312337	Frame — Upper, FS 333.625	7178-T6 Extr	1E861	
21	265-313345	Frame — Upper, FS 346.5	7178-T6 Bare	0.032	53-10-20 Fig. 201
22	265-312357	Bulkhead Assy — FS 357	7178-T6 Extr	4E750	
23	306-312035	Longeron — Upper, FS 206 +5.25 to 357	7178-T6 Extr	4E682	
24	306-312036	Longeron — Lower, FS 206 to 357	7178-T6 Extr	4E699	
25	265-313334	Frame — Side, FS 346.5	2024-T42 Bare	0.025	53-10-20 Fig. 201
26	265-312336	Frame — Side, FS 333.625	2024-T42 Bare	0.025	
27	265-313343	Frame — Lower, FS 346.5	7178-T6 Bare	0.032	53-10-20 Fig. 201
28	265-312324	Frame — Side, FS 324.750	7178-T6 Bare	0.040	
29	265-312332	Frame — Lower, FS 333.625	7178-T6 Bare	0.032	
30	306-312323	Frame — Lower, FS 324.750	7178-T6 Bare	0.040	
31	265-312316	Frame — Side, FS 316	7178-T6 Bare	0.040	
32	265-312307	Frame — Side, FS 307.250	7178-T6 Extr	6E1114	
33	265-312315	Frame Web — Lower, FS 316	7178-T6 Bare	0.063	
34	306-312294	Frame — Side, FS 298.5 +2	7178-T6 Bare	0.040	
34A	306-312295	Frame — Side, FS 298.5 +19	7178-T6 Bare	0.040	
35	306-312308	Frame — Side, FS 298.5 +21	7178-T6 Bare	0.080	
36	265-312306	Frame Web — Lower, FS 307.25	7178-T6 Bare	0.063	
37	306-312302	Frame — Side, FS 298.5 +10.5	7178-T6 Bare	0.050	
38	306-312300	Frame Web — Lower, FS 298.5 +21	2024-T42 Bare	0.040	
39	306-312003-17	Intercostal — Window, Upper	7178-T6 Bare	0.040	
40	306-312298	Frame — Side, FS 298.5	7178-T6 Bare	0.080	
41	306-312003-19	Intercostal — Lower, Window	7178-T6 Bare	0.040	
42	306-312299	Frame — Lower, FS 298.5 +10.5	7178-T6 Bare	0.040	
43	265-312289	Frame — Side, FS 289.5	7178-T6 Bare	0.080 A	
43A	265-312260-1 and -2 or 282-312262-5 and -6	Fitting — Wing Attach, FS 264.312	7075-T6A1 Alloy 7075-T651 Bare	2.750 2.500	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

Key to Figure 4 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
44	265-312297	Frame — Lower, FS 298.5	7178-T6 Bare	0.032	
45	265-312281	Frame — Side, FS 281	7178-T6 Bare	0.050	
46	265-312288	Frame — Lower, FS 289.5	7178-T6 Bare	0.063	
47	306-312284	Frame — Lower, FS 285.5	7178-T6 Bare	0.063	
48	265-312270	Frame — Side, FS 272.5	7178-T6 Extr	6E1008	
49	306-312003-69	Intercostal — Upper, FS 242 to 264.50	7178-T6 Extr	6E1109	
50	306-312003-71	Intercostal — Lower, FS 242 to 264.50	7178-T6 Extr	6E1109	
51	265-312264	Frame — Side, FS 264.25	7178-T6 Extr	2E450	
52	265-312254	Frame — Side, FS 257.56	7178-T6 Bare	0.040	
53	265-312246	Frame — Side, FS 249.125	7178-T6 Bare	0.050 [A]	
54	265-312241	Frame — Side, FS 242	7178-T6 Extr	2E485	
55	265-312003	Intercostal — FS 215.5 to 233.5	7178-T6 Bare	0.040	
56	265-312231	Frame — Side, FS 233.5	7178-T6 Extr	6E1008	
57	265-312224	Frame — Side, FS 224.5	7178-T6 Bare	0.040	
58	265-312215	Frame — Side, FS 215.5	7178-T6 Bare	0.080 [A]	
59	306-312212	Frame — Side, FS 206 +17	7178-T6 Extr	3E96	
60	306-312209	Frame — Side, FS 206 +9	7178-T6 Bare	0.050	
61	265-312206	Frame — Side, FS 206	7178-T6 Extr	3E96	
62	306-312015	Upper Skin, FS 206 to 359	2024-T3 Bare	0.050 [A]	53-30-20, Fig 206
63	306-312016	Side Skin — FS 206 to 357	2024-T3 Bare	0.050 [A]	53-30-20, Fig 206
64	306-312020-3	Lower Skin — FS 298 to 333	2024-T42 Bare	0.050	53-30-20, Fig 206
65	306-312020-5	Lower Skin — FS 333 to 357	2024-T42 Bare	0.050	53-30-20, Fig 206
66	306-312018	Lower Skin — FS 257.562 to 298.5	7178-T6 Bare	0.050	53-30-20, Fig 206
67	265-300501	Lower Skin — FS 206 to 257.562	2024-T3 Bare	0.050	53-30-20, Fig 206
68	306-312014	Lower Skin — FS 206 to 206 +17	7075-T6 Bare	0.050	53-30-20, Fig 206
69	265-312007	Floor Assy — Side, FS 206 to 264.250			53-20-20, Fig 201
	265-312007-3	Facing Sheet	7178-T6 Bare	0.016	
	265-312007-5	Facing Sheet	7178-T6 Bare	0.016	
	265-312007-7	Core	5052-H39 Honeycomb	1/8 x 0.0015	
69A	306-312110	Floor Assy — Side, FS 206 to 206.17			
70	265-312005	Floor Assy — Center, FS 206.17 to 247			53-20-20, Fig 201
	265-312005-3	Facing Sheet — Upper	7178-T6 Bare	0.016	
	265-312005-5	Facing Sheet — Lower	7178-T6 Bare	0.016	
	265-312005-7	Core	5052-H39 Honeycomb	1/8 x 0.0015	
71	265-312005-11	Floor Assy — Center, FS 247 to 264.250			53-20-20, Fig 201
	265-312005-17	Facing Sheet — Upper	7178-T6 Bare	0.016	
	265-312005-19	Facing Sheet — Lower	7178-T6 Bare	0.016	
	265-312005-21	Core	5052-H39 Honeycomb	1/8 x 0.0015	
72	265-312006	Floor Assy — FS 264.25 to 298.5			53-20-20, Fig 201
	265-312006-3	Facing Sheet — Upper	7178-T6 Bare	0.032	
	265-312006-5	Facing Sheet — Lower	7178-T6 Bare	0.025	
	265-312006-7	Core	5052-H39 Honeycomb	1/8 x 0.002	
73	306-312151	Floor Assy — Web, FS 298.5 to 333.625	2024-T3 Bare	0.063	

NOTES

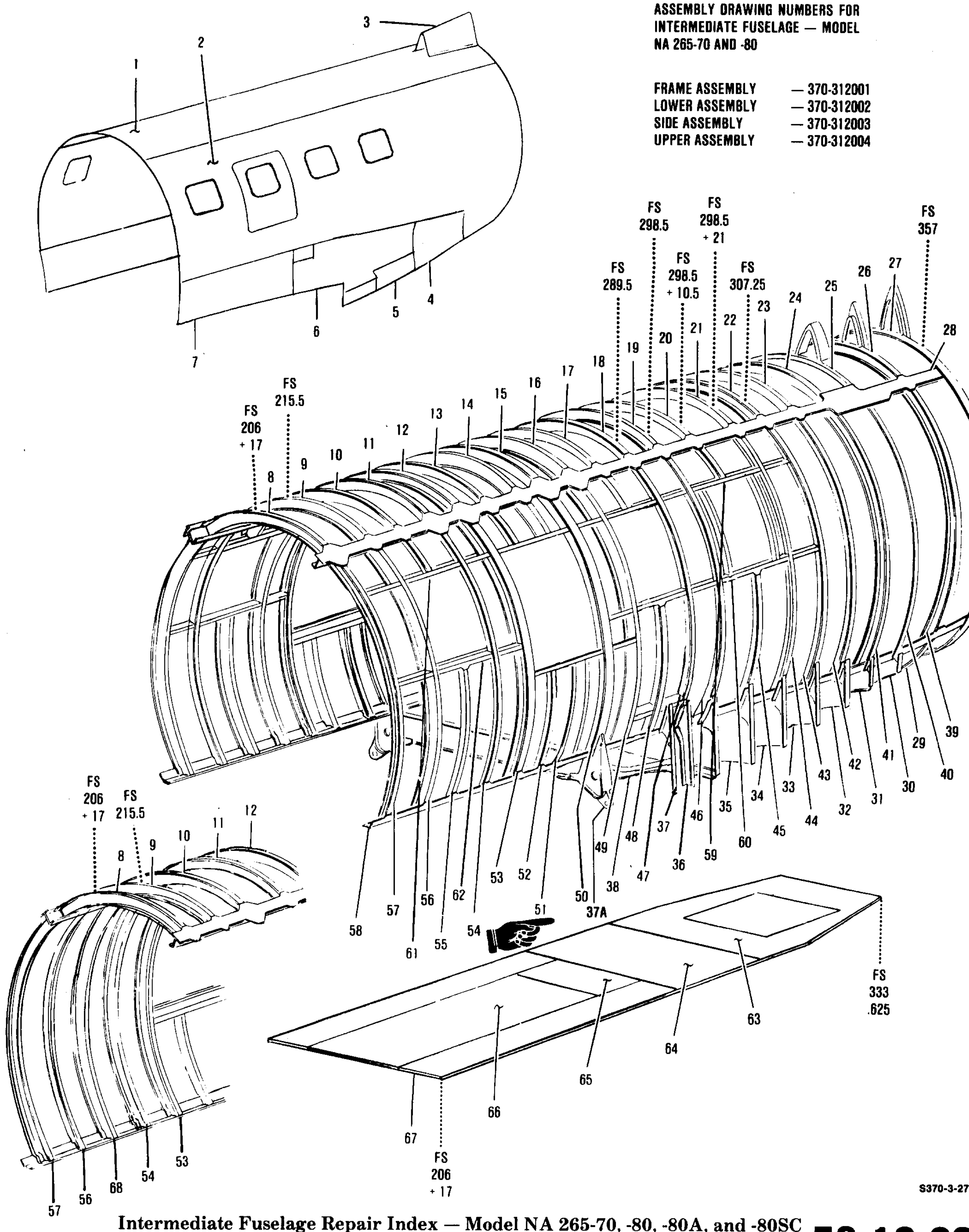
- For additional repairs, refer to 51-70-00.

[A] This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

Key to Figure 4 (Sheet 2 of 2)

ASSEMBLY DRAWING NUMBERS FOR INTERMEDIATE FUSELAGE — MODEL NA 265-70 AND -80

FRAME ASSEMBLY	— 370-312001
LOWER ASSEMBLY	— 370-312002
SIDE ASSEMBLY	— 370-312003
UPPER ASSEMBLY	— 370-312004



Intermediate Fuselage Repair Index — Model NA 265-70, -80, -80A, and -80SC
Figure 5

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	370-312015	Skin — Upper, FS 206 +17 to 357	2024-T3 Bare	0.050 A	53-30-20, Fig 206
2	370-312016	Skin — Side, FS 206 +17 to 357	2024-T3 Bare	0.050 A	53-30-20, Fig 206
3	265-313007	Skin — Dorsal, FS 333.625 to 357	7178-T6 Bare	0.032	
4	370-312020	Skin — Lower, FS 298.5 +21 to 333.625	2024-T42 Bare	0.050	53-30-20, Fig 206
5	370-312019	Skin — Lower, FS 298.5 to 298.5 +21	2024-T42 Bare	0.050	53-30-20, Fig 206
6	306-312018	Skin — Lower, FS 264.25 to 298.5 +21	7178-T6 Bare	0.050	53-30-20, Fig 206
7	265-300501	Skin — Fairing, FS 206 +17 to 264.25	2024-T3 Bare	0.050	
8	370-312207	Frame — Upper, FS 206 +17	7178-T6 Extr	3E95	
9	370-312216-3	Frame — Upper, FS 215.5	7178-T6 Extr	ST04355-21LS0002	
10	370-312225-11	Frame — Upper, FS 224.5	7178-T6 Bare	0.063	53-20-20, Fig 204
11	370-312290-5	Frame — Upper, FS 233.5	7178-T6 Extr	ST04355-21LS0002	
12	370-312243-3	Frame — Upper, FS 242	7178-T6 Extr	ST04355-21LS0002	53-10-20, Fig 201
13	370-312225-31	Frame — Upper, FS 249.125	7178-T6 Bare	0.063	
14	370-312225-31	Frame — Upper, FS 257.562	7178-T6 Bare	0.063	
15	370-312265-3	Frame — Upper, FS 264.25	7178-T6 Extr	ST04355-21LS0002	53-10-20, Fig 201
16	370-312216-5	Frame — Upper, FS 272.5	7178-T6 Extr	ST04355-21LS0002	
17	370-312282-11	Frame — Upper, FS 281	7178-T6 Bare	0.063	
18	370-312290-11	Frame — Upper, FS 289.5	7178-T6 Extr	ST04355-21LS0002	
19	370-312305-3	Frame — Upper, FS 298.5	7178-T6 Bare	0.080	
20	370-312297-3	Frame — Upper, FS 298.5 +10.5	7178-T6 Bare	0.063	
21	370-312304-3	Frame — Upper, FS 298.5 +21	7178-T6 Extr	ST04365-21LS0001	
22	370-312309-3	Frame — Upper, FS 307.250	7178-T6 Bare	0.063	
23	370-312284-11	Frame — Upper, FS 316	7178-T6 Bare	0.063	
24	370-312283-3	Frame — Upper, FS 324.750	7178-T6 Bare	ST04355-21LS0002	
25	370-312337	Frame — Upper, FS 333.625	2024-T42 Bare	0.063	
26	370-313345	Frame — Upper, FS 346.5	2024-T42 Bare	0.032	53-10-20, Fig 201
27	370-312357	Bulkhead Assy — FS 357			
	370-312357-5	Cap Angle	7178-T6 Extr	4E752	
	370-312357-79	Web	7178-T6 Bare	0.020	
28	370-312035	Longeron — Upper, FS 206 +5.25 to 357	7178-T6511 Extr	4E682	
29	370-313343	Frame — Lower, FS 346.5	7178-T6 Bare	0.032	53-10-20, Fig 201
30	370-312332	Frame — Lower, FS 333.625	7178-T6 Bare	0.040	
31	370-312323	Frame — Lower, FS 324.750	2024-T42 Bare	0.040	
32	306-312315	Frame — Lower, FS 316	7178-T6 Bare	0.063	
33	370-312306	Frame — Lower, FS 307.25	7178-T6 Bare	0.063	
34	370-312300	Frame — Lower, FS 298.5 +21	7178-T6 Bare	0.032	
35	370-312299-5	Frame — Lower, FS 298.5 +10.5	7178-T6 Bare	0.040	
36	370-312288	Frame — Lower, FS 289.5	7075-T6 Extr	4E117	
37	306-312284-11	Frame — Lower, FS 285.5	7178-T6 Bare	0.063	
37A	265-312260-1 and -2	Fitting — Wing Attach, FS 264.312	7075-T6A1 Alloy	2.750	
	282-312262-3 and -4		7075-T651 Bare	2.500	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

Key to Figure 5 (Sheet 1 of 2)

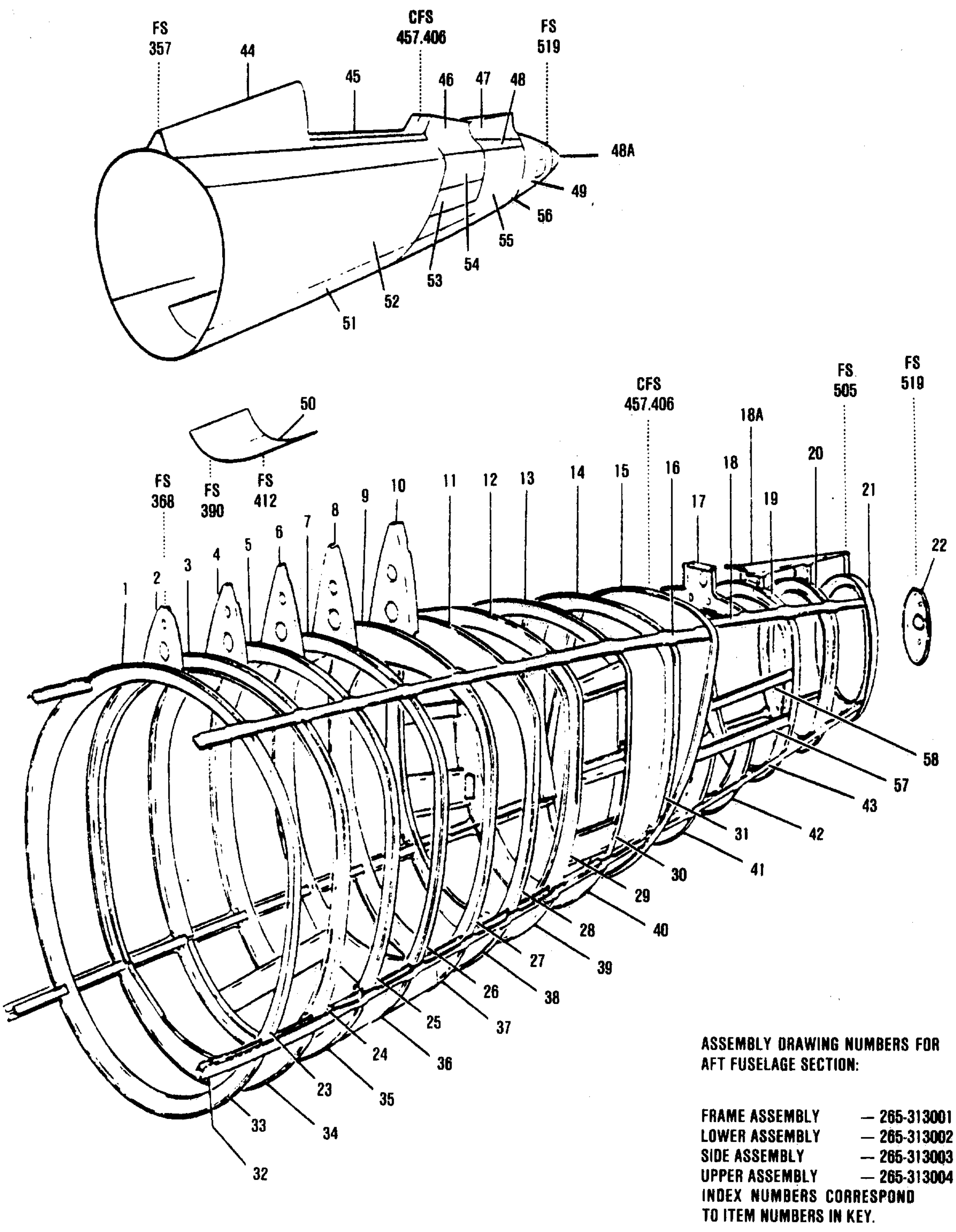
STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
38	370-312293	Frame — Lower, FS 298.5	7178-T6 Bare	0.032	
39	370-313344	Frame — Side, FS 346.5	7075-T6 Bare	0.032	53-10-20, Fig 201
40	370-312336	Bulkhead Assy — FS 333.625			
	370-312336-3	Web	2024-T3 Clad	0.032	
	370-312336-7	Cap	7075-T6 Bare	0.071	
41	370-312324	Frame — Side, FS 324.750	7178-T6 Extr	ST04355-21LS0004	
42	370-312316	Frame — Side, FS 316	7178-T6 Extr	ST04355-21LS0011	
43	370-312307	Frame — Side, FS 307.250	7178-T6 Extr	ST04355-21LS0011	
44	370-312308	Frame — Side, FS 298.5 +21	7178-T6 Extr	6E1092	
45	370-312302	Frame — Side, FS 298.5 +10.5	7178-T6 Bare	0.071	
46	370-312298	Frame — Side, FS 298.5	7178-T6 Bare	0.091	
47	370-312289	Frame — Side, FS 289.5	7178-T6 Extr	ST04345 21LS0003	
48	370-312281	Frame — Side, FS 281	7178-T6 Bare	0.063	
49	370-312270	Frame — Side, FS 272.5	7178-T6 Extr	ST04345 21LS0003	
50	370-312264	Frame — Side, FS 264.25	7178-T6 Bare	ST04345 21LS0006	
51	370-312254	Frame — Side, FS 257.56	7178-T6 Bare	0.063	
52	370-312246	Frame — Side, FS 249.125	7178-T6 Bare	0.063	
53	370-312241	Frame — Side, FS 242	7178-T6 Bare	ST04355 21LS0003	
54	370-312231	Frame — Side, FS 233.5	7178-T6 Extr	ST04345 21LS0003	
55	370-312224	Frame — Side, FS 224.5	7178-T6 Bare	0.063	
56	370-312215	Frame — Side, FS 215.5	7178-T6 Extr	ST04345 21LS0003	
57	370-312212	Frame — Side, FS 206 +17	7178-T6 Extr	3E96	
58	306-312036	Longeron — Lower FS 206 to 357	7178-T6511 Extr	4E699	
59	370-312056-23	Intercostal — Upper, FS 264.25 to 307.25	7178-T6 Bare	0.063	
60	370-312057-29	Intercostal — Lower, FS 264.25 to 307.25	7178-T6 Bare	0.050	
61	370-312056-9	Intercostal — Upper, FS 198 to 242	7178-T6 Bare	0.063	
62	370-312057-3	Intercostal — Lower, FS 198 to 242	7178-T6 Bare	0.050	
63	306-312151	Floor Assy — FS 298.5 to 333.625	2024-T3 Bare	0.063	
64	265-312006	Floor Assy — FS 264.25 to 298.5			53-20-20, Fig 201
	265-312006-65	Facing Sheet — Lower	7178-T6 Bare	0.025	
	265-312006-67	Facing Sheet — Upper	7178-T6 Bare	0.032	
	265-312006-69	Honeycomb Core	5052-H39	1/8x0.002	
65	265-312005-11	Floor Assy — FS 247 to 264.25			53-20-20, Fig 201
	265-312005-17	Facing Sheet — Upper	7178-T6 Bare	0.016	
	265-312005-19	Facing Sheet — Lower	7178-T6 Bare	0.016	
	265-312005-21	Honeycomb Core	5052-H39	1/8x0.0015	
66	265-312005	Floor Assy — FS 206 to 264.25			53-20-20, Fig 201
	265-312005-3	Facing Sheet — Upper	7178-T6 Bare	0.016	
	265-312005-5	Facing Sheet — Lower	7178-T6 Bare	0.016	
	265-312005-7	Honeycomb Core	5052-H39	1/8x0.0015	
67	370-312007	Floor Assy — FS 206 +17 to 264.25			53-20-20, Fig 201
	370-312007-3	Facing Sheet — Upper	7178-T6 Bare	0.016	
	370-312007-5	Facing Sheet — Lower	7178-T6 Bare	0.016	
	370-312007-7	Honeycomb Core	5052-H39	1/8x0.015	
68	370-312223	Frame FS 224.5 (RH)	7178-T6 Bare	0.063	

NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 5 (Sheet 2 of 2)



Aft Fuselage Repair Index —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 6

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-313369	Frame — Upper, FS 368	7178-T6 Bare	0.025	53-10-20, Fig 204
2	265-313008-13	Frame — Dorsal Fin, FS 368	7178-T6 Bare	0.025	
3	265-313380	Frame — Upper, FS 379	7178-T6 Bare	0.025	53-10-20, Fig 204
4	265-313008-11	Frame — Dorsal Fin, FS 379	7178-T6 Bare	0.025	
5	265-313391	Frame — Upper, FS 390	7178-T6 Bare	0.025	53-10-20, Fig 204
6	265-313008-9	Frame — Dorsal Fin, FS 390	7178-T6 Bare	0.025	
7	265-313402	Frame — Upper, FS 401	7178-T6 Bare	0.025	53-10-20, Fig 204
8	265-313008-7	Frame — Dorsal Fin, FS 401	7178-T6 Bare	0.025	
9	265-313413	Frame — Upper, FS 412	7178-T6 Bare	0.025	
10	265-313008-5	Frame — Dorsal Fin, FS 412	7178-T6 Bare	0.025	
11	265-313423	Frame — Upper, FS 422	7178-T6 Bare	0.032	
12	265-313433	Frame — Upper, FS 432	7178-T6 Bare	0.025	
13	265-313444	Frame — Upper, FS 443.5	7178-T6 Bare	0.025	
14	265-313456	Frame — Upper, FS 455	7178-T6 Bare	0.025	53-10-20, Fig 204
15	265-313460	Bulkhead Assy — CFS 457.406	7178-T6 Bare	0.071 A	
16	265-313015	Longeron — Upper, FS 357 to CFS 457.406	7178-T6 Extr	4E752	
17	265-313469	Frame — Upper, CFS 469.75	7178-T6 Bare	0.040	53-10-20, Fig 215
18	265-313005-5	Longeron — Upper Aft, FS 465 to 505	7178-T6 Bare	0.032	
18A	265-313020	Rib	7178-T6 Bare	0.040	53-10-20, Fig 216
19	265-313485	Frame Assy — FS 485	7178-T6 Bare	0.025	
20	265-313495	Frame Assy — FS 495	7178-T6 Bare	0.025	
21	265-313505	Frame Assy — FS 505	7178-T6 Bare	0.025	
22	265-313006-11	Frame Assy — FS 519	7178-T6 Bare	0.040	
23	265-313368	Frame — Side, FS 368	7178-T6 Bare	0.025	
24	265-313379	Frame — Side, FS 379	7178-T6 Bare	0.025	
25	265-313390	Frame — Side, FS 390	7178-T6 Bare	0.040 A	
26	265-313401	Frame — Side, FS 401	7178-T6 Bare	0.025	53-10-20, Fig 204
27	265-313412	Frame — Side, FS 412	7178-T6 Bare	0.025	
28	265-313422	Frame — Side, FS 422	7178-T6 Bare	0.025	
29	265-313432	Frame — Side, FS 432	7178-T6 Bare	0.025	
30	265-313443	Frame — Side, FS 443.5	7178-T6 Bare	0.040 A	
31	265-313455	Frame — Side, FS 455	7178-T6 Bare	0.025	53-10-20, Fig 204
32	265-313016	Longeron — Lower to CFS 457.406	7178-T6 Extr	3E94	
33	265-313367	Frame — Lower, FS 368	7178-T6 Bare	0.025	53-10-20, Fig 204
34	265-313378	Frame — Lower, FS 379	7178-T6 Bare	0.025	
35	265-313389	Frame — Lower, FS 390	7178-T6 Bare	0.040 A	
36	265-313400	Frame — Lower, FS 401	7178-T6 Bare	0.025	53-10-20, Fig 204
37	265-313411	Frame Assy — Lower, FS 412			
	265-313411-3	Frame	7178-T6 Bare	0.025	
	265-313411-5	Angle	7178-T6 Bare	0.032	
38	265-313421	Frame — Lower, FS 422	7178-T6 Bare	0.025	
39	265-313431	Frame — Lower, FS 432	7178-T6 Bare	0.025	
40	265-313442	Frame — Lower, FS 443.5	7178-T6 Bare	0.025	
41	265-313465	Frame — Lower, FS 465	7178-T6 Bare	0.025	
42	265-313475	Frame — Lower, FS 475	7178-T6 Bare	0.025	
43	265-313005-3	Longeron — Aft, Lower, FS 457.406 to 505	7178-T6 Bare	0.032	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

Key to Figure 6 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

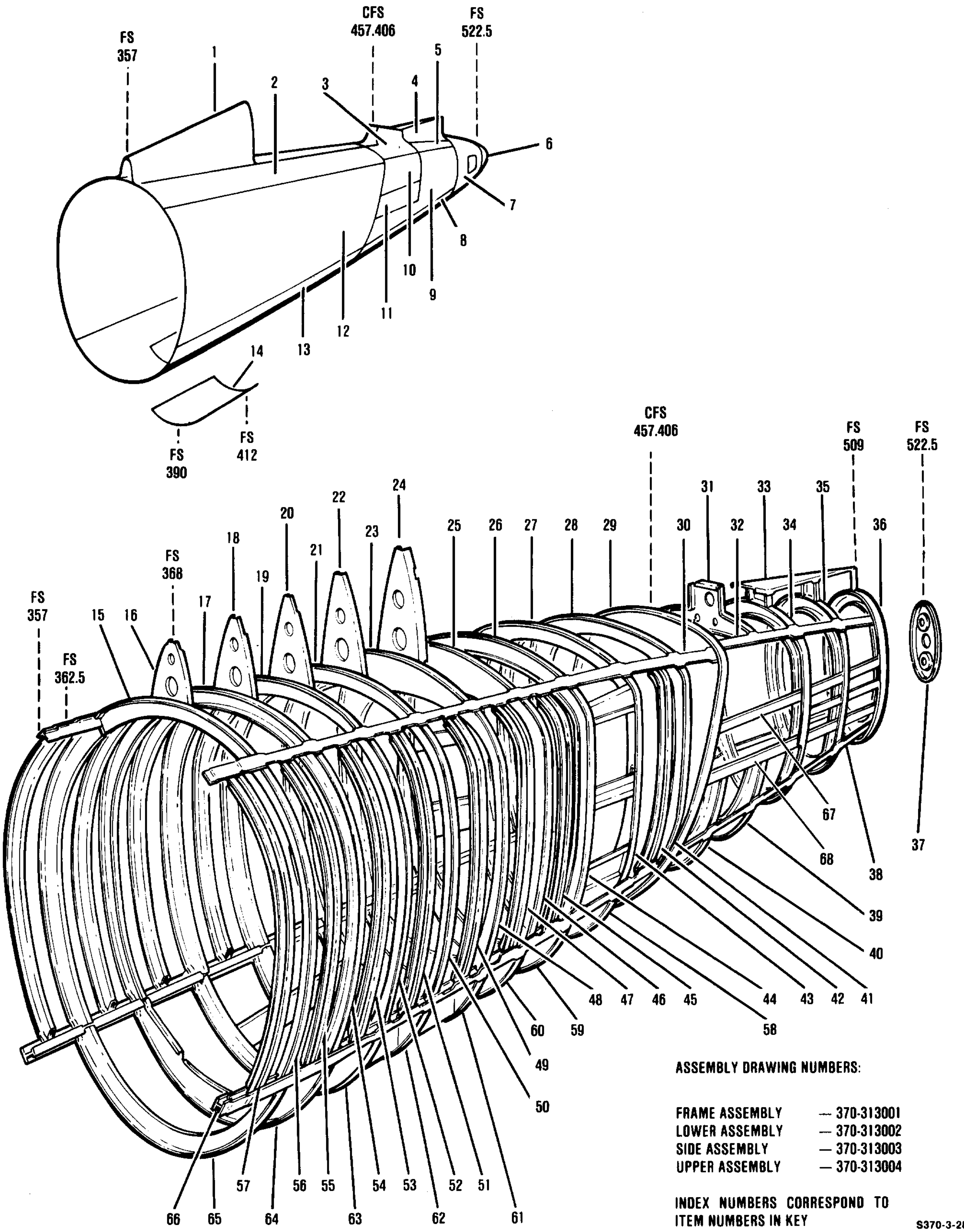
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
44	265-313008-3	Skin — Dorsal, FS 357 to 412	7178-T6 Bare	0.032 A	53-30-20, Fig 206
45	265-313104	Skin — Top, FS 357 to CFS 457.406	7178-T6 Bare	0.040 A	53-30-20, Fig 206
46	265-313115	Fairing — Forward	7178-T6 Bare	0.040 A	53-30-20, Fig 206
47	265-313111	Fairing — Aft	7178-T6 Bare	0.040	
48	265-313110	Skin — Top, FS 485 to 505	7178-T6 Bare	0.040 A	53-30-20, Fig 206
48A	276-484007	Cone — Tail, FS 517.750 to 525	Acrylic Sheet	0.125	
49	265-313006	Skin — Aft, FS 504 to 519	Mag Aly Sheet	0.040	
50	265-300052	Door Assy — Access, FS 390 to 412			
	265-300052-17 and -18	Skins — Inner	2024-T42 Clad	0.025	
	265-300052-19 and -20	Skin — Outer	2024-T42 Clad	0.025	
51	265-313102	Skin — Bottom, FS 357 to CFS 457.406	7178-T6 Bare	0.040 A	53-30-20, Fig 206
52	265-313103	Skin — Side, FS 357 to CFS 457.406	7178-T6 Bare	0.040 A	53-30-20, Fig 206
53	265-313005-17	Skin — Side, CFS 457.406 to 485	Mag Aly Sheet	0.050	
54	265-313005-25	Skin — Side, CFS 457.406 to 485	Mag Aly Sheet	0.050	
55	265-313105	Skin — Side, CFS 457.406 to 505	7178-T6 Bare	0.040 A	53-30-20, Fig 206
56	265-313109	Skin — Bottom, 457.406 to 505	7178-T6 Bare	0.040 A	53-30-20, Fig 206
57	265-313005-7, -8	Stringer	2024-T42	0.032	
58	265-313005-9, -10	Stringer	2024-T42	0.032	

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

Key to Figure 6 (Sheet 2 of 2)



Aft Fuselage Repair Index —
Model NA 265-70, -80, -80A, and -80SC
Figure 7

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-313008-3	Skin — Dorsal Fin, FS 357 to 412	7075-T6 Bare	0.032	53-30-20, Fig 206
2	370-313104-3	Skin — Top, FS 357 to CFS 457.406	2024-T3 Bare	0.040 A	53-30-20, Fig 206
3	370-313115-1 & -2	Fairing Fwd	2024-T3 Bare	0.040 A	53-30-20, Fig 206
4	370-313111-3 & -4	Fairing Aft	2024-T42 Bare	0.040	
5	370-313110-3	Skin — Top, FS 485 to 509	2024-T42 Bare	0.040 A	53-30-20, Fig 206
6	265-484113	Tail Cone	Acrylic Sheet	0.125	
7	370-313006-3 & -5	Skin — Aft, FS 509 to 522.5	2024-T42 Bare	0.040	
8	370-313109-3	Skin — Bottom, CFS 457.406 to FS 509	2024-T42 Bare	0.040 A	53-30-20, Fig 206
9	370-313105	Skin — Side, CFS 457.406 to FS 509	2024-T42 Bare	0.040 A	53-30-20, Fig 206
10	370-313005-53	Door — Side, CFS 457.406 to FS 485	2024-T42 Bare	0.040	
11	370-313005-55	Door — Side, CFS 457.406 to FS 485	2024-T42 Bare	0.040	
12	370-313103	Skin — Side, FS 357 to CFS 457.406	2024-T3 Bare	0.040 A	53-30-20, Fig 206
13	265-313102-3	Skin — Bottom, FS 357 to CFS 457.406	7178-T6 Bare	0.040 A	53-30-20, Fig 206
14	265-300052	Access Door Assy — FS 390 to 412			
	265-300052-17 & -18	Inner Skin	2024-T42 Clad	0.025	
	265-300052-19 & -20	Outer Skin	2024-T42 Clad	0.025	
15	370-313369-3	Frame — Upper, FS 368	7178-T6 Bare	0.025	53-10-20, Fig 203
16	265-313008-13	Frame — Dorsal Fin, FS 368	7178-T6 Bare	0.025	53-10-20, Fig 204
17	370-313380	Frame — Upper, FS 379	7178-T6 Bare	0.025	53-10-20, Fig 204
18	265-313008-11	Frame — Dorsal Fin, FS 379	7178-T6 Bare	0.025	53-10-20, Fig 204
19	370-313391-11	Frame — Upper, FS 390	7178-T6 Bare	0.025	53-10-20, Fig 204
20	265-313008-9	Frame — Dorsal Fin, FS 390	7178-T6 Bare	0.025	53-10-20, Fig 204
21	370-313402-3	Frame — Upper, FS 401	7178-T6 Bare	0.025	53-10-20, Fig 204
22	265-313008-7	Frame — Dorsal Fin, FS 401	7178-T6 Bare	0.025	
23	370-313413-11	Frame — Upper, FS 412	2024-T42 Bare	0.025	53-10-20, Fig 204
24	265-313008-5	Frame — Dorsal Fin, FS 412	7178-T6 Bare	0.025	
25	370-313423-11	Frame — Upper, FS 422	2024-T42 Bare	0.063	53-10-20, Fig 204
26	370-313433-3	Frame — Upper, FS 434.891	2024-T42 Bare	0.025	53-10-20, Fig 204
27	370-313444-3	Frame — Upper, FS 446.241	2024-T42 Bare	0.025	53-10-20, Fig 204
28	370-313456-3	Frame — Upper, FS 455	2024-T42 Bare	0.025	53-10-20, Fig 204
29	370-313460-3	Bulkhead — CFS 457.406	7178-T6 Bare	0.071 A	
30	370-313015	Longeron — Upper FS 357 to CFS 457.406	7178-T6 Extr	4E752	
31	370-313469	Frame — Upper, FS 470.06	2024-T42 Bare	0.040	53-10-20, Fig 215
32	370-313005-3	Longeron — Upper Aft, FS 465 to 509	2024-T42 Bare	0.032	
33	265-313111-5	Rib — Aft Fairing	2024-T42 Bare	0.040	53-10-20, Fig 216
34	370-313485	Frame Assy — FS 485	2024-T42 Bare	0.032	53-10-20, Fig 203
35	370-313495	Frame Assy — FS 499	2024-T42 Bare	0.032	53-10-20, Fig 203
36	370-313505	Frame Assy — FS 509	2024-T42 Bare	0.032	53-10-20, Fig 203
37	265-313006-17	Frame Assy — FS 522.5	6061-T6 Bare	0.040	
38	370-313005-5	Longeron — Aft Lower, CFS 457.406 to FS 509	2024-T42 Bare	0.032	
39	370-313475	Frame — Lower, FS 475	2024-T42 Bare	0.032	
40	370-313465	Frame — Lower, FS 465	2024-T42 Bare	0.032	
41	370-313455	Frame — Lower, FS 455	2024-T42 Bare	0.050	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

Key to Figure 7 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
42	370-313449	Frame — Side, FS 449.25	2024-T42 Bare	0.050	
43	370-313443	Frame — Side, FS 443.775	2024-T42 Bare	0.040	53-10-20, Fig 204
44	370-313432	Frame — Side, FS 432.408	2024-T42 Bare	0.050	53-10-20, Fig 204
45	370-313427	Frame — Side, FS 428	2024-T42 Bare	0.050	53-10-20, Fig 204
46	370-313422	Frame — Side, FS 422	2024-T42 Bare	0.050	53-10-20, Fig 204
47	370-313417	Frame — Side, FS 417	2024-T42 Bare	0.050	
48	370-313412	Frame — Side, FS 412	2024-T42 Bare	0.050	53-10-20, Fig 204
49	370-313406	Frame — Side, FS 406.5	2024-T42 Bare	0.050	
50	370-313401	Frame — Side, FS 401	2024-T42 Bare	0.050	53-10-20, Fig 204
51	370-313395	Frame — Side, FS 395.5	2024-T42 Bare	0.050	
52	370-313390	Frame — Side, FS 390	2024-T42 Bare	0.050	
53	370-313362-9	Stiffener — Side, FS 384.5	2024-T42 Clad	0.025	
54	370-313379	Frame — Side, FS 379	7178-T6 Bare	0.025	53-10-20, Fig 204
55	370-313362-7	Stiffener — Side, FS 373.5	2024-T42 Clad	0.025	
56	370-313368	Frame — Side, FS 368	7178-T6 Bare	0.025	53-10-20, Fig 204
57	370-313362-3	Stiffener — Side, FS 362.5	2024-T42 Clad	0.025	
58	370-313422	Frame — Lower, FS 443.5	7178-T6 Bare	0.025	53-10-20, Fig 204
59	265-313431	Frame — Lower, FS 432	7178-T6 Bare	0.025	53-10-20, Fig 204
60	265-313421	Frame — Lower, FS 422	7178-T6 Bare	0.025	53-10-20, Fig 204
61	265-313411	Frame — Assy — Lower, FS 412			
	265-313411-3	Frame	7178-T6 Bare	0.025	
	265-313411-5	Angle	7178-T6 Bare	0.032	
62	265-313400	Frame — Lower, FS 401	7178-T6 Bare	0.025	53-10-20, Fig 204
63	265-313389-11	Frame — Lower, FS 390	7178-T6 Bare	0.025	53-10-20, Fig 204
64	265-313378-101	Frame — Lower, FS 378	7178-T6 Bare	0.025	53-10-20, Fig 204
65	265-313367-11	Frame — Lower, FS 368	7178-T6 Bare	0.025	53-10-20, Fig 204
66	370-313016	Longeron — Lower, FS 357 to CFS 457.706	7178-T6 Extr	3E94	
67	370-313005-7, -8	Stringer	2024-T42	0.032	
68	370-313005-9, -10	Stringer	2024-T42	0.032	

NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 7 (Sheet 2 of 2)

MAIN FRAME

REPAIRS

GENERAL

This section contains repairs to the fwd fuselage, intermediate fuselage, and aft fuselage. For applicability of repairs, refer to 53-10-00. See figures 201 through 217.

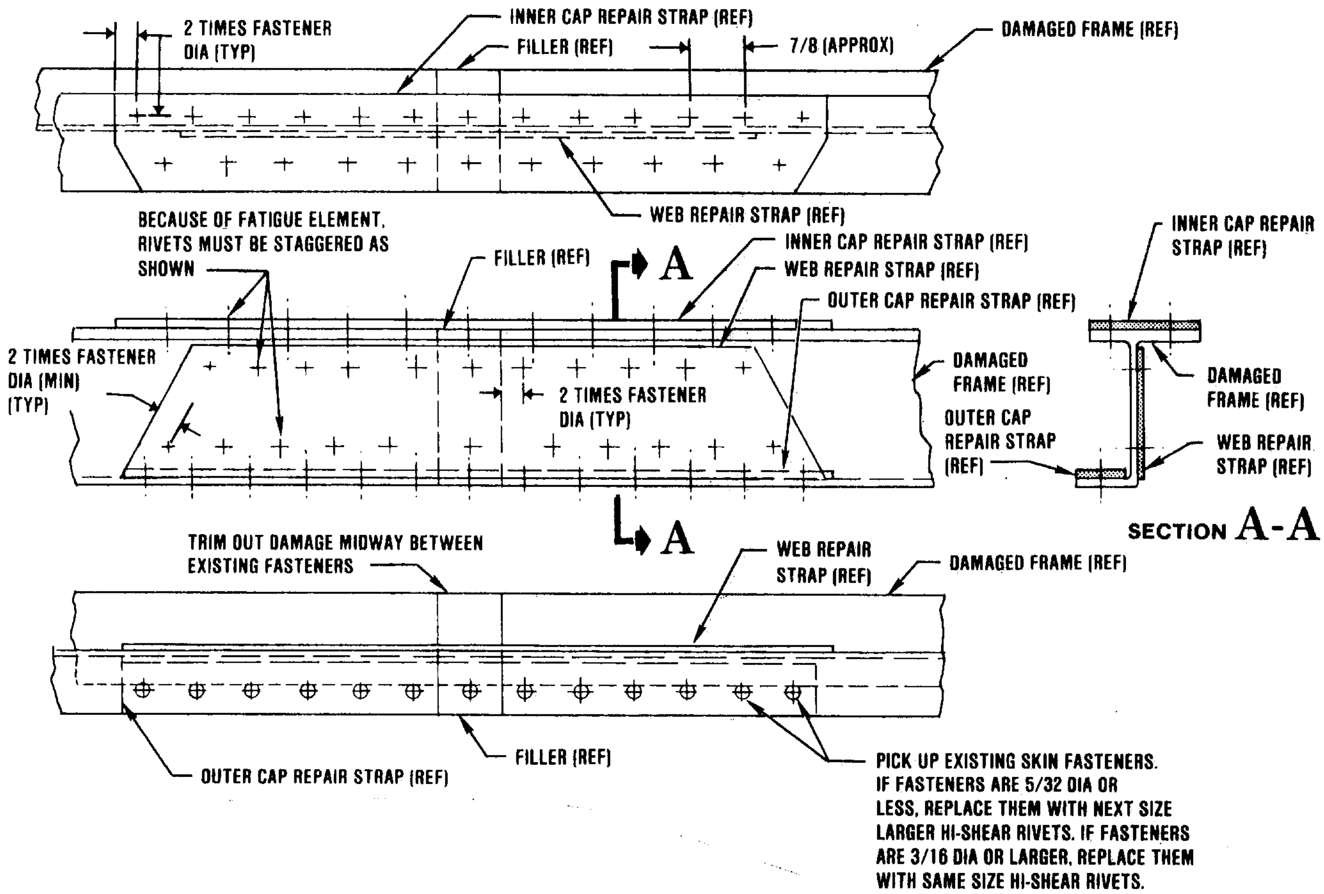
REPAIRS

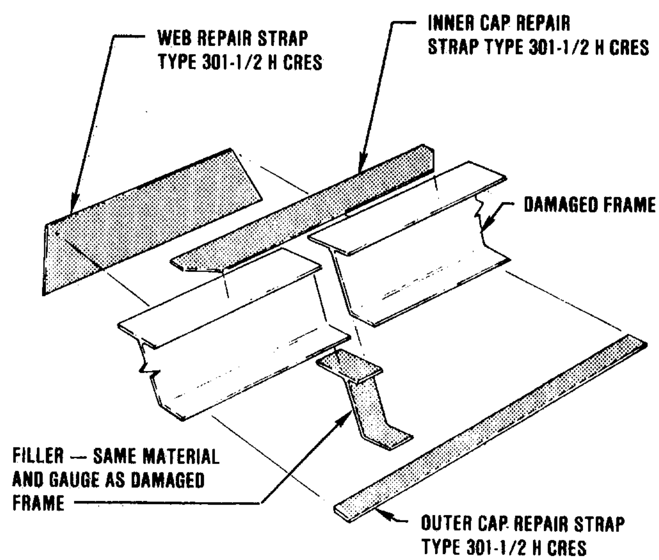
On chem-milled skin repairs, the thinned areas of the chem-milled fuselage skins have been reduced to a minimum gauge consistent with the applicable load and fatigue factors and crack propagation resistance. Drilling holes in the thinned skin for the application of repairs is not permitted. Chem-milled skin repairs for the pressurized and non-pressurized areas are shown in section 53-30-20.

CAUTION

On airplanes with the remote sensing unit for the standby compass mounted in the aft fuselage at FS 522.5, a minimum of 36 in. must be maintained between the sensing unit and any steel or magnetic materials added in this area. Non magnetic materials are the only acceptable materials that may be added in this area.

TYPICAL FASTENER PATTERN FOR EXTRUDED FRAME REPAIRS



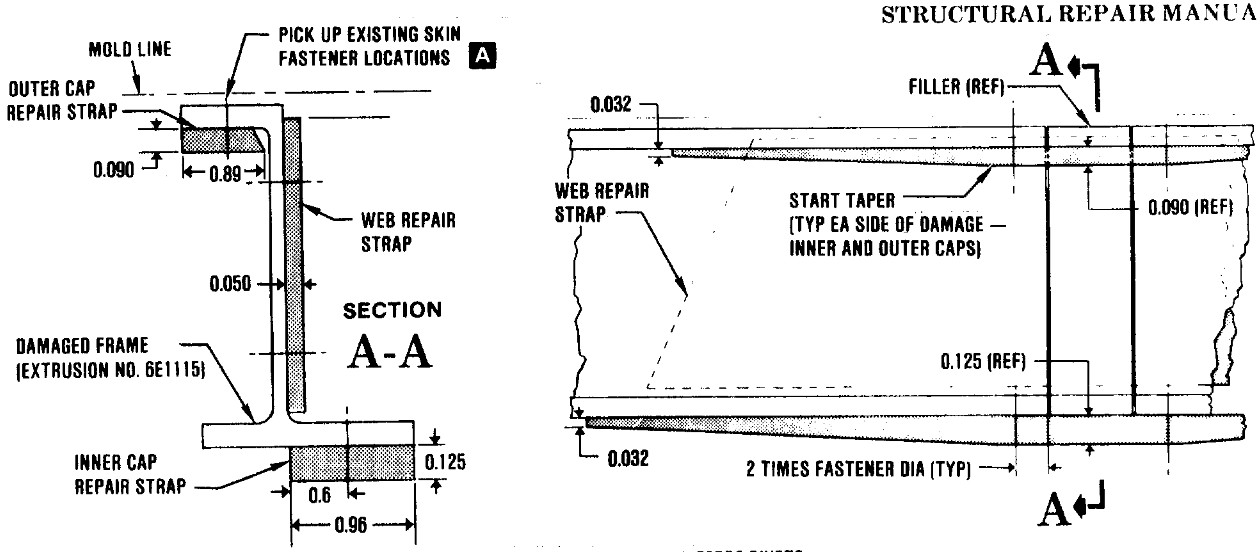


NOTES

- BECAUSE OF FATIGUE ELEMENT, RIVETS ON ALL FRAME REPAIRS MUST BE STAGGERED AS SHOWN. LENGTH OF WEB REPAIR STRAP SHOULD BE SHORTER BY AT LEAST TWO RIVETS ON EACH END THAN LENGTH OF OUTER CAP REPAIR STRAP, AND SHOULD BE SHORTER BY ONE RIVET ON EACH END THAN LENGTH OF INNER CAP REPAIR STRAP.
- NUMBER OF RIVETS SHOWN FOR EACH FLANGE IS **MIN** NUMBER REQUIRED TO MAKE SATISFACTORY REPAIR.

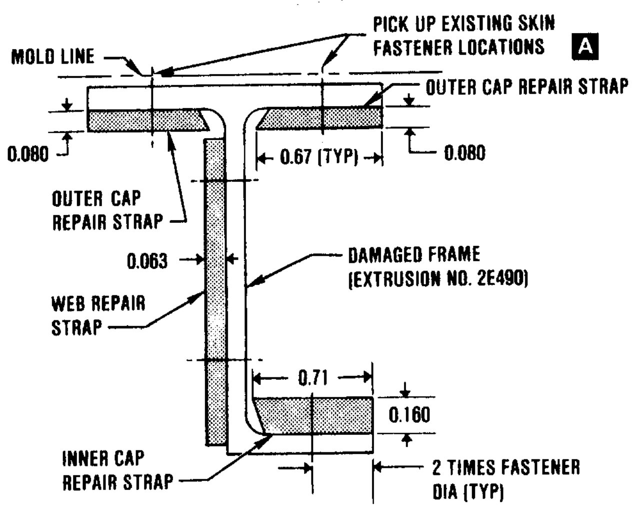
S265-3-115

Typical Fuselage Frame Repair
Figure 201



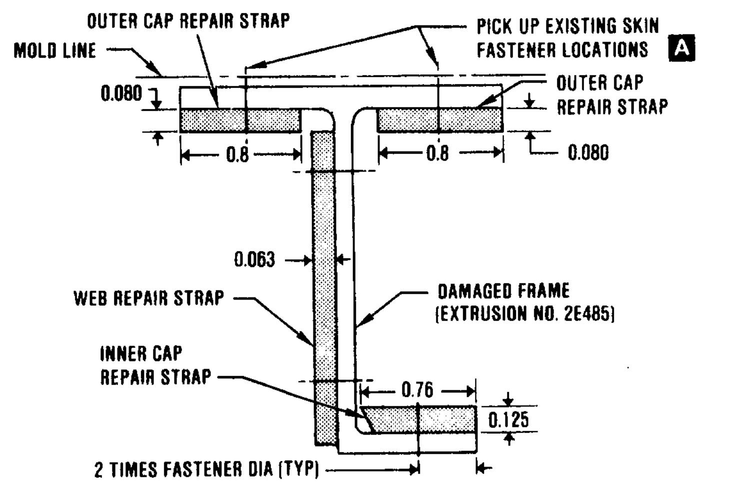
REPAIR FASTENERS ARE AN470DD6 RIVETS

THIS REPAIR IS APPLICABLE TO RIGHT-HAND FRAME AT FS 174



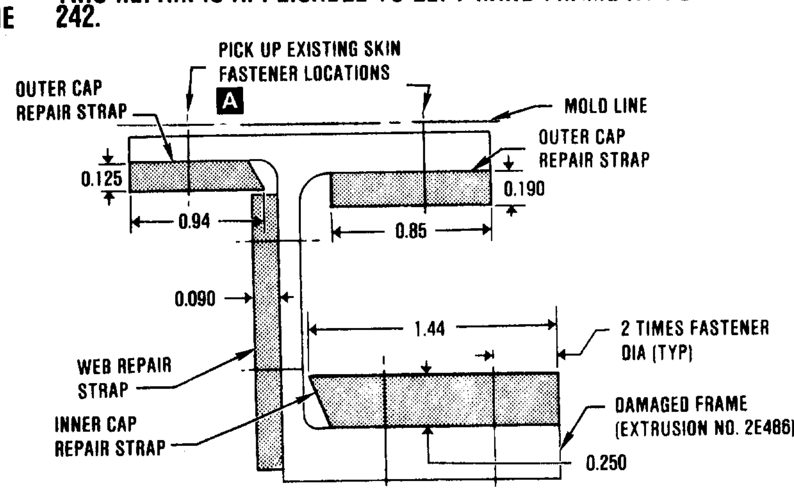
REPAIR FASTENERS ARE 3/16 IN. DIA HI-SHEAR RIVETS

THIS REPAIR IS APPLICABLE TO UPPER FUSELAGE FRAME AT FS 242.



REPAIR FASTENERS ARE 3/16 IN. DIA HI-SHEAR RIVETS

THIS REPAIR IS APPLICABLE TO LEFT-HAND FRAME AT FS 242.



REPAIR FASTENERS ARE 3/16 IN. DIA HI-SHEAR RIVETS

THIS REPAIR IS APPLICABLE TO RIGHT-HAND FRAME AT FS 242.

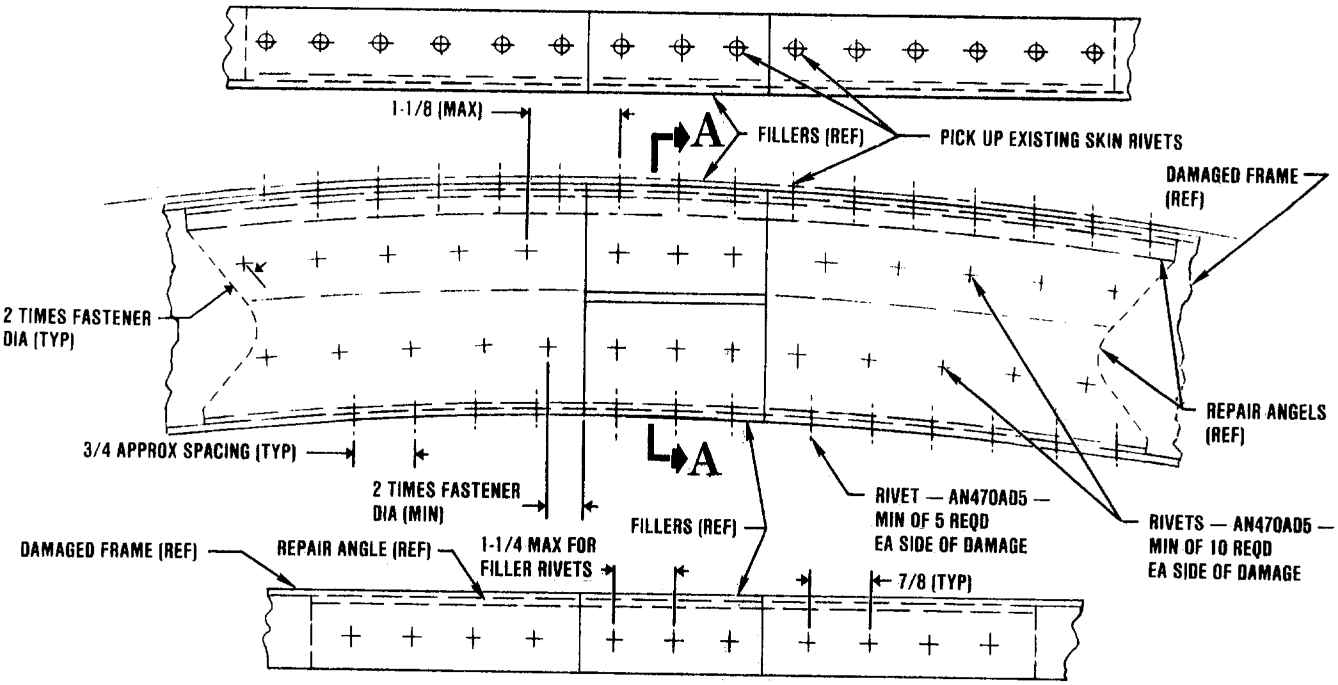
NOTES

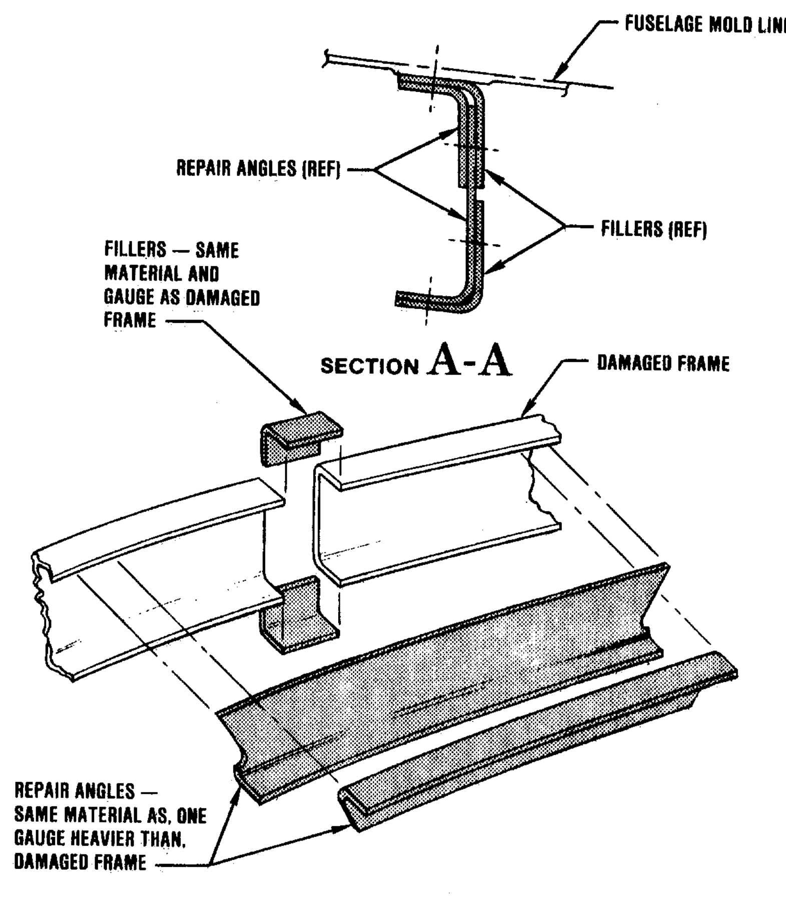
- ALL REPAIR STRAPS ARE TO BE TYPE 301-1/2H CORROSION-RESISTANT STEEL.
- FILLERS ARE TO BE OF SAME MATERIAL, GAUGE, AND SHAPE AS DAMAGED FRAME. IF LENGTH OF FILLER IS GREATER THAN ONE RIVET SPACING, IT MUST BE LONG ENOUGH TO CONTAIN 10 RIVETS.
- FASTENER PATTERN AND DIMENSIONS FOR FASTENER SPACING AND EDGE DISTANCE MUST CORRESPOND TO FASTENER LAYOUT AND DIMENSIONS GIVEN IN FIGURE 201.
- TAPER ALL REPAIR STRAPS ON FRAME CAPS TO 0.032 AS SHOWN IN REPAIR FOR FS 174.

A IF SKIN FASTENERS BEING REPLACED ARE 5/32 IN. DIA OR LESS, REPLACEMENT FASTENER MUST BE NEXT SIZE LARGER HI-SHEAR RIVET. IF FASTENERS BEING REPLACED ARE 3/16 IN. DIA OR LARGER, REPLACEMENT FASTENER MUST BE SAME SIZE HI-SHEAR RIVET.

S265-3-116

Extruded Frame Repairs
Figure 202





1 Trim out damage midway between existing fasteners.

2 Smooth all edges and corners.

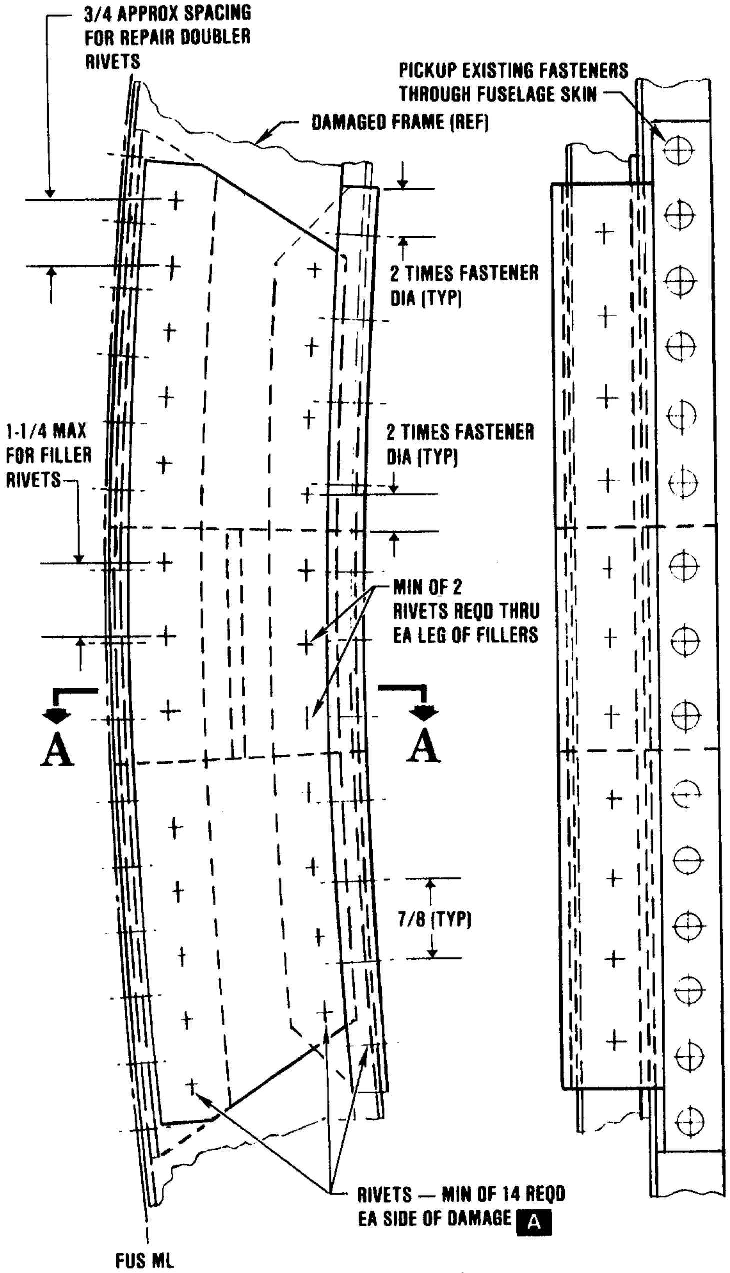
3 Make fillers to match damage cutout in damaged frame.

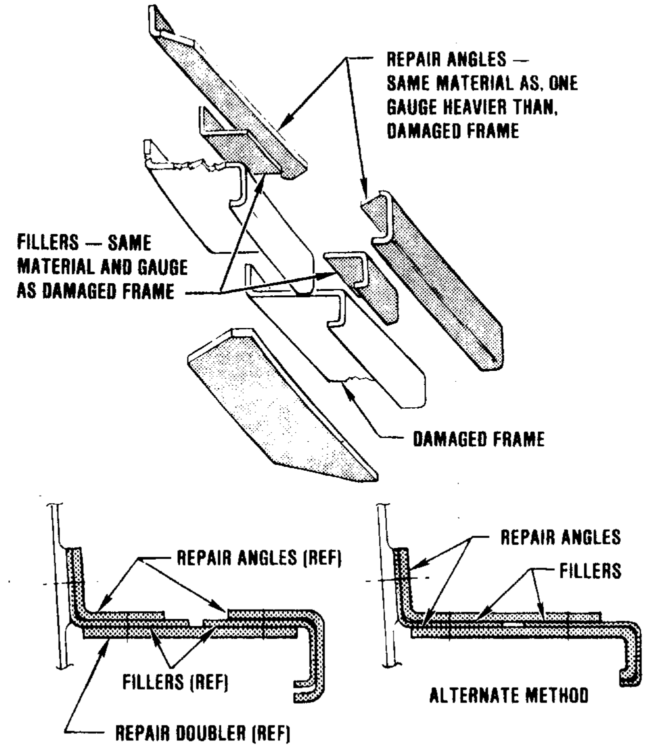
4 Use same type of material in repair angle as was used in damaged frame; however, use one gauge heavier material. Repair angles may be made from material in either "T6" or "O" condition. Use a 3/16 in. bend radius for repair angles made from material in "T6" condition; use a 3/32 in. bend radius for repair angles made from material in "O" condition.

NOTES

- REPAIR ANGLES MADE FROM MATERIAL IN "O" CONDITION MUST BE HEAT-TREATED TO "T6" CONDITION AFTER THEY HAVE BEEN CONTOURED.
- THIS REPAIR IS APPLICABLE TO UPPER AND LOWER FRAMES AT FS 346.500.
- STAGGERED PATTERN OF END RIVETS IS ESSENTIAL TO MEET FATIQUE REQUIREMENTS.

C-section Frame Repair
Figure 203





SECTION **A-A**

1 Trim out damage midway between existing fasteners.

2 Smooth all edges and corners.

3 Make fillers to match damage cutout.

4 Make repair angles and repair doubler. Use table on this illustration to determine required material thickness.

5 Fasten all repair parts in place, using size and type of fasteners required and spacing called out.

6 Prime all materials with epoxy polyamide primer.

	STATION	LOCATION	RH	LH	MATL THICKNESS
	58	UPPER	X	X	0.040
	67	UPPER	X	X	0.040
B	368	UPPER, LOWER			0.025
B	379	UPPER			0.025
B	390	UPPER			0.025
	401	SIDE, LOWER	X	X	0.025
B	401	UPPER			0.025
B	455	UPPER			0.025
	455	SIDE	X	X	0.025

NOTES

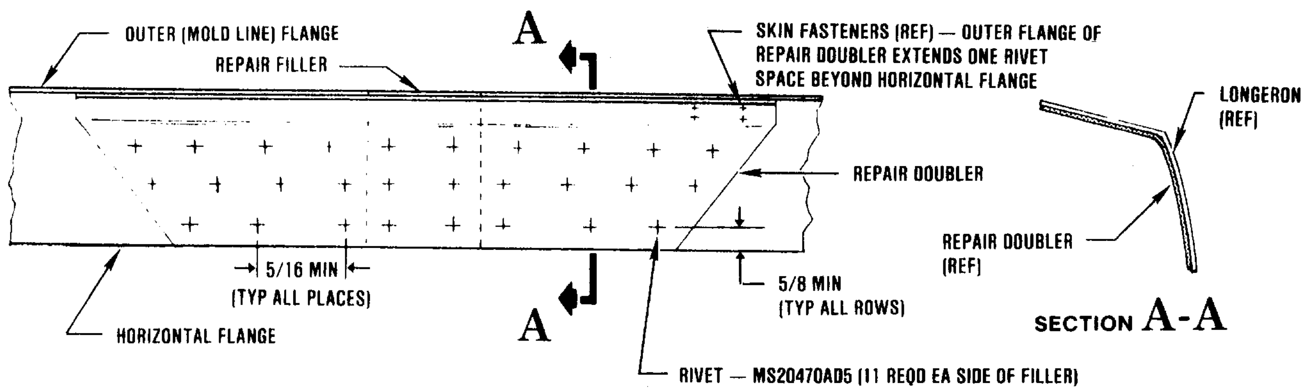
- IF DAMAGE LENGTH IS LESS THAN TWICE FASTENER DIA, FILLERS NEED NOT BE USED.
- END RIVETS MUST BE STAGGERED BECAUSE OF FATIGUE ELEMENT.

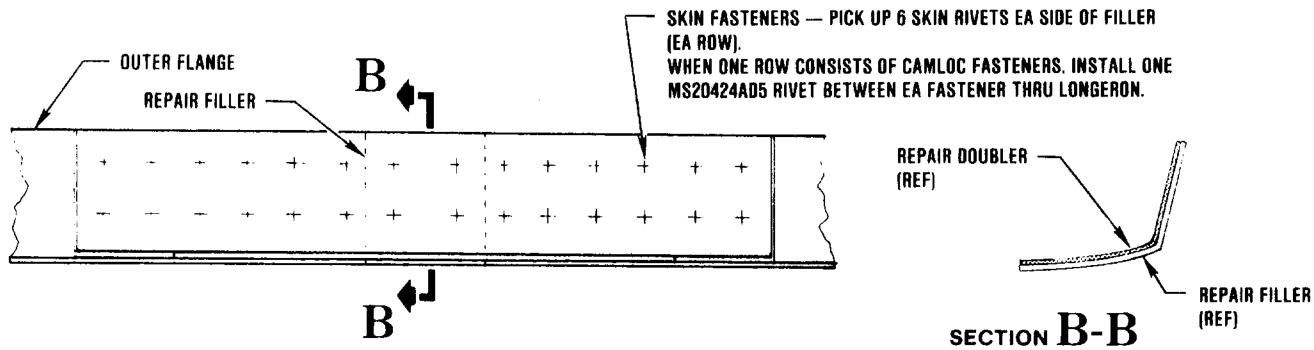
A ON FRAMES MADE OF 0.025- AND 0.032 IN. MATERIAL, USE AN470AD5 RIVETS. ON FRAMES MADE OF 0.040- AND 0.050 IN. MATERIAL, USE AN470DD6 RIVETS. IF FASTENER REMOVED IS LARGER THAN THE PREVIOUSLY DESIGNATED FASTENERS, REPLACE IT WITH A FASTENER OF SAME SIZE.

B FRAMES CODED **B** ARE SINGLE-PIECE, SYMMETRICAL ABOUT CENTERLINE OF AIRPLANE.

S265-3-118A

Z-section Frame Repair
Figure 204





1 Trim out damaged longeron and longeron strap. Position trim line so that max edge distance between all fasteners is maintained.

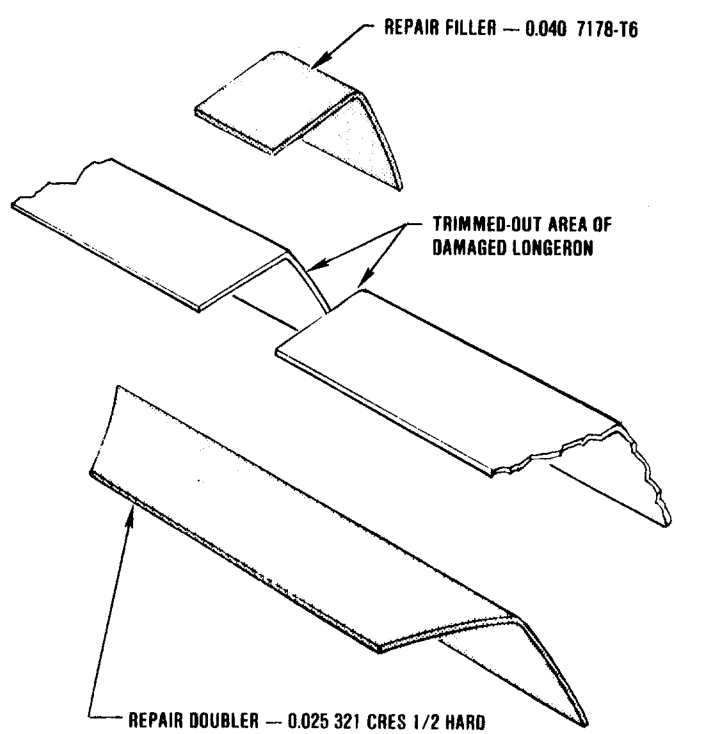
2 Remove frame clips and file frame ends when necessary.

3 Fabricate repair parts, including new frame clips.

4 Prime all repair parts.

5 Install repair parts and rivet in place.

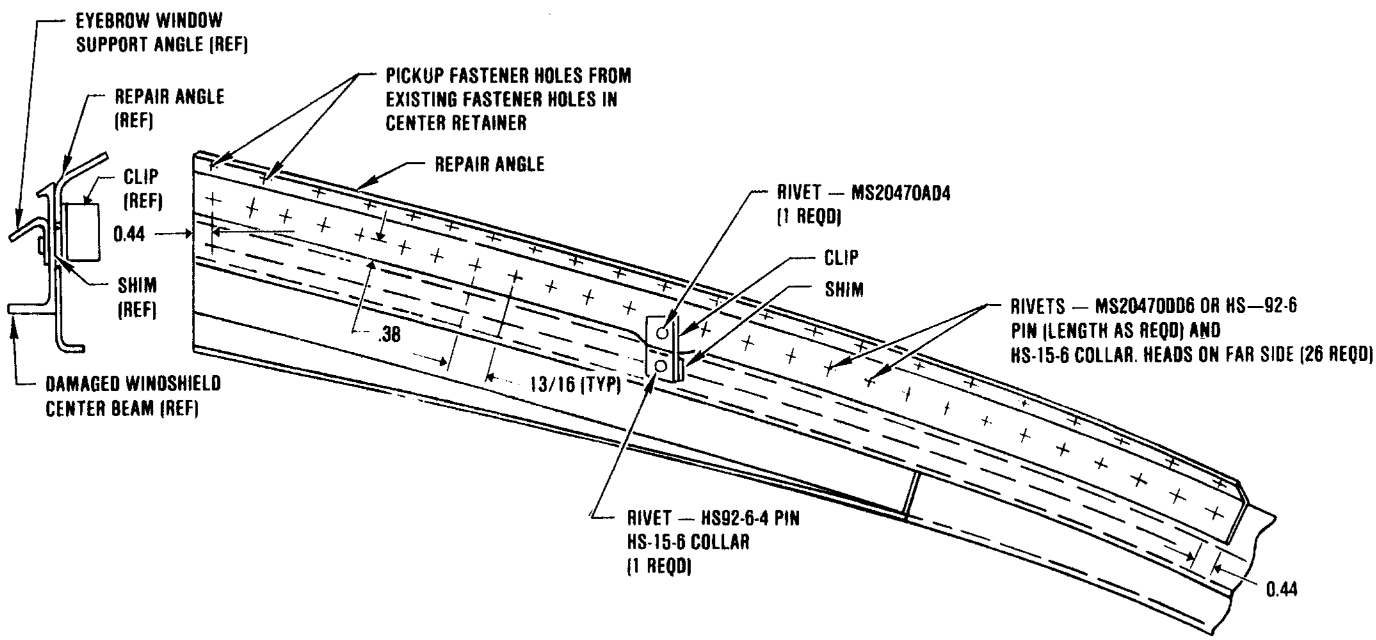
6 Install new frame clips, picking up existing holes in frames.

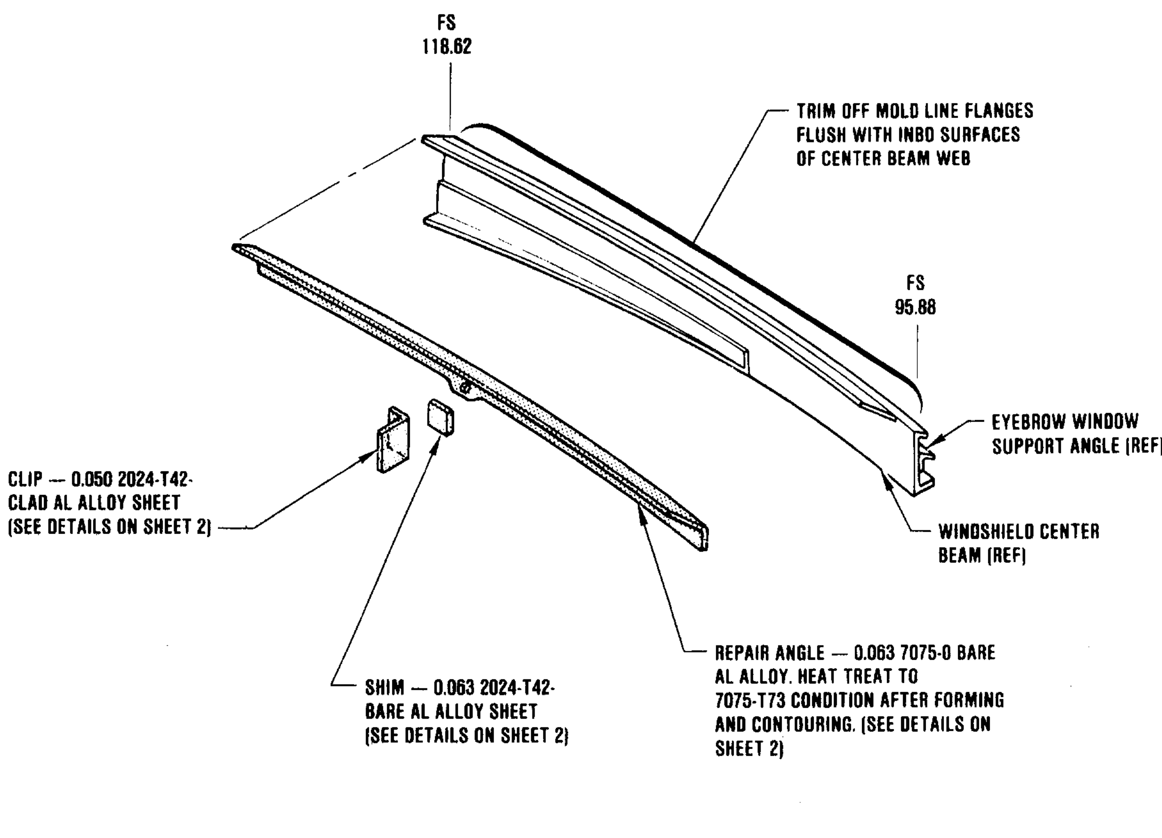


NOTES

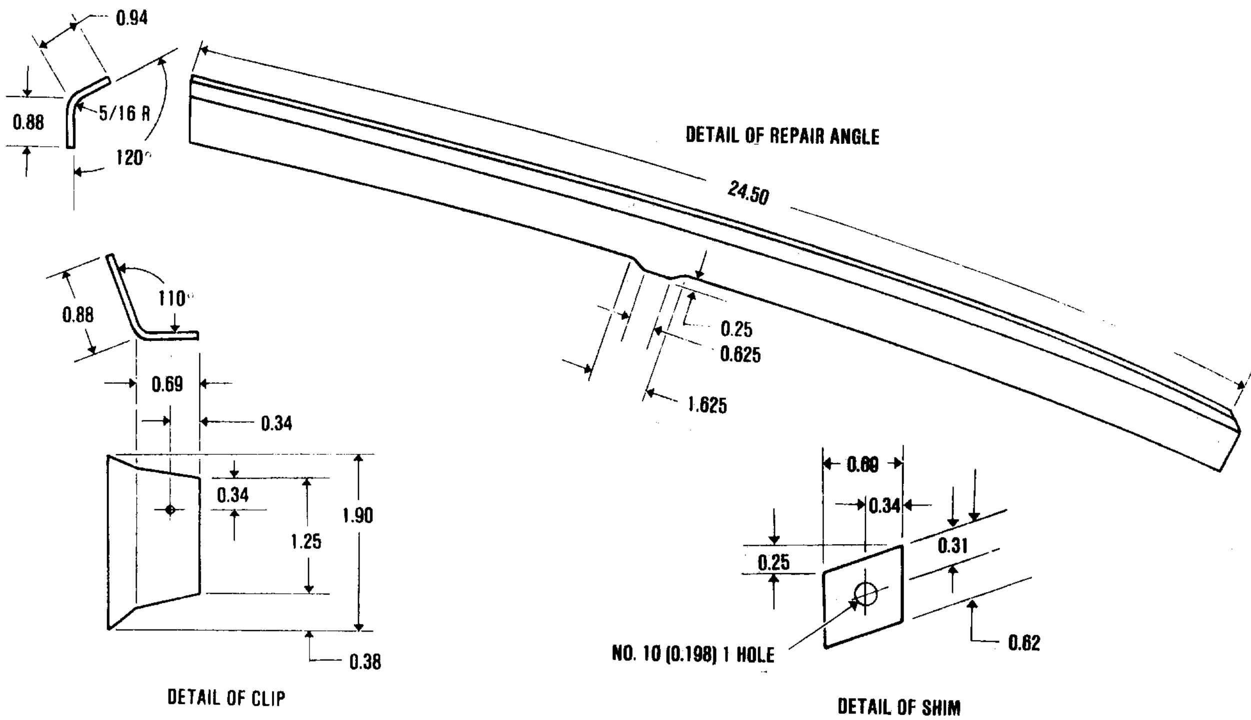
- THIS REPAIR IS APPLICABLE TO COCKPIT ENCLOSURE LONGERON (WATER PLANE -5 APPROXIMATELY), FROM FS 13 TO 50.
- REPAIR SHOWN MAY BE USED AS A SPLICE WHEN A SECTION OF LONGERON MUST BE REPLACED. RIVET REQUIREMENTS EA SIDE OF SPLICE JOINT ARE SAME AS THOSE GIVEN FOR EA SIDE OF FILLER.
- WHERE REPAIR CROSSES A FRAME, REMOVE FRAME CLIPS AND, WHEN NECESSARY, FILE FRAME ENDS TO PROVIDE SPACE FOR REPAIR PARTS. FABRICATE NEW FRAME CLIPS TO MATCH THOSE REMOVED, EXCEPT FOR HOLE LOCATIONS. MAKE CLIPS FROM 0.025 IN. 1/2 HARD CRES.

Cockpit Enclosure Longeron Repair —
Fuselage Stations (FS) 13 to 50
Figure 205





Windshield Center Beam Repair
Figure 206 (Sheet 1 of 2)



1 Remove eyebrow windows and retainers. Refer to Chapter 56 of applicable Maintenance Manual.

2 Trim off damaged mold line flange between FS 95.88 and 118.062 flush with inbd surface of center beam web.

3 Smooth all edges of trimmed area.

4 Remove clip from inbd side of beam web at FS 108.

5 Fabricate repair angle, clip and shim. Form repair angle to match mold line.

6 Temporarily install eyebrow window and upper retainer in place using minimum number of fasteners to ensure proper positioning of window.

7 Check that vertical flange of repair angle fits flat against center beam web and that mold line flange of repair angle fits tight against upper retainer with less than 0.010 gap between flange and retainer.

8 Heat treat repair angle to 7075-T73 condition.

9 Recheck contour of repair angle to make certain repair angle has not warped during heat treatment. Recontour if necessary to eliminate any gaps exceeding 0.010 in.

10 Trim repair angle to size. Allow sufficient material on vertical flange to pick up clip rivet at FS 108.

11 Secure repair angle in place. Layout and drill 26 fastener holes through repair angle and center beam web. Pick up one fastener hole through clip, repair angle and center beam web.

12 Back drill through upper retainer to pick up existing fastener locations on mold line flange of repair angle.

13 Remove eyebrow window, retainers and repair angle.

14 Remove all chips and smooth all edges of repair angle.

15 Chem film treat repair angle, clip, shim, and all bare surfaces of center beam assembly. Apply one coat of epoxy polyamide primer to all chem film treated surfaces.

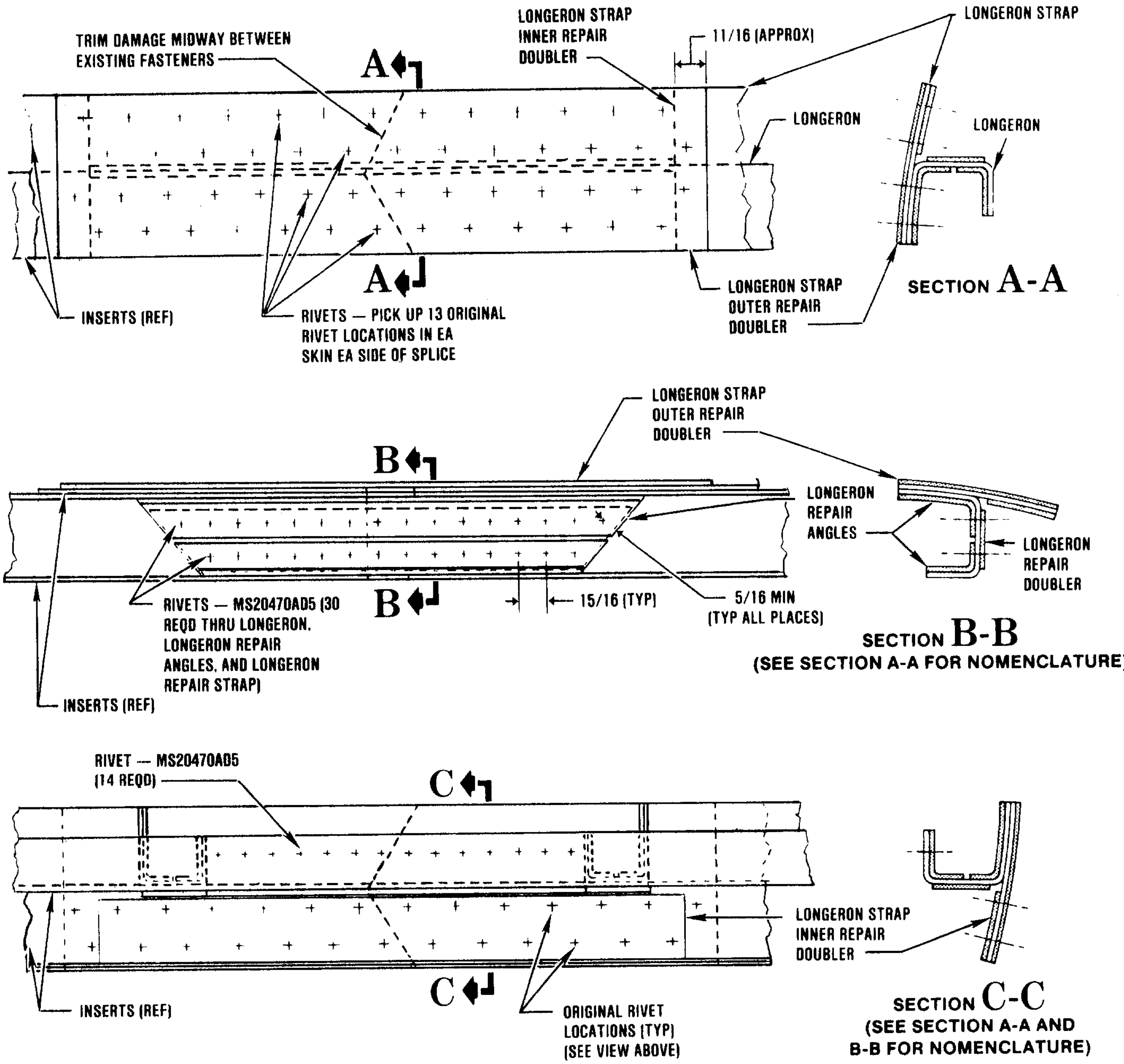
16 Install repair angle using size and type of fasteners called out.

17 Reinstall eyebrow windows and retainers as instructed in Chapter 56 of the applicable Maintenance Manual.

NOTE

IF THIS REPAIR IS ACCOMPLISHED ON ONLY ONE SIDE OF CENTER BEAM ASSEMBLY, MOLD LINE FLANGE OF THE UNREPAIRED SIDE MUST BE SHIMMED IN ACCORDANCE WITH INSTRUCTIONS IN CHAPTER 56 OF APPLICABLE MAINTENANCE MANUAL.

Windshield Center Beam Repair
Figure 206 (Sheet 2 of 2)

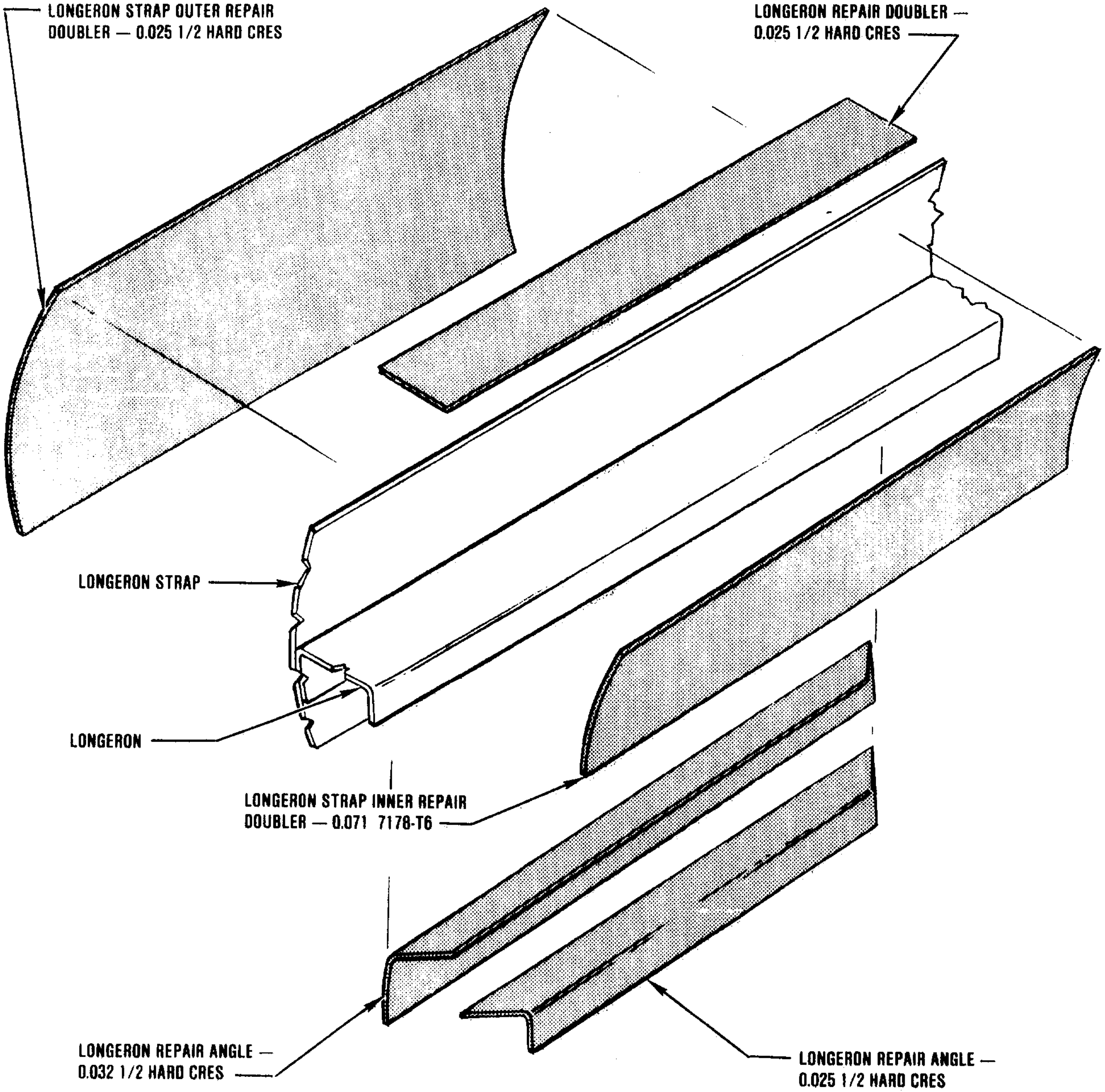


NOTES

- THIS REPAIR IS APPLICABLE TO COCKPIT ENCLOSURE LONGERON (WATER PLANE +0 TO APPROXIMATELY +7), FROM FS 50 TO 143.
- REPAIR SHOWN IS A SPLICE. WHEN SPLICED MEMBER IS AN INSERT, JOINT SHOWN IS DUPLICATED AT EACH END.
- WHEN DAMAGED AREA IS SMALL, A FILLER MATCHING REMOVED SECTION MAY BE USED.
- EXTEND REPAIR PARTS EACH SIDE OF FILLER TO PICK UP FASTENERS SHOWN FOR EACH SIDE OF SPLICE.
- WHERE REPAIR CROSSES A FRAME, REMOVE FRAME CLIPS AND, WHEN NECESSARY, FILE FRAME ENDS TO PROVIDE SPACE FOR REPAIR PARTS. FABRICATE NEW FRAME CLIPS TO MATCH THOSE REMOVED, EXCEPT FOR HOLE LOCATIONS. MAKE CLIPS FROM SAME GAUGE AND MATERIAL AS EXISTING CLIPS.

S265-3-120

Cockpit Enclosure Longeron Repair — Fuselage Stations (FS) 50 to 143
Figure 207 (Sheet 1 of 2)



1 Trim out damaged longeron and longeron strap section. Position trim line so that max edge distance between all fasteners is maintained.

2 Remove frame clips and file frame ends when necessary.

3 Fabricate repair parts, including new frame clips.

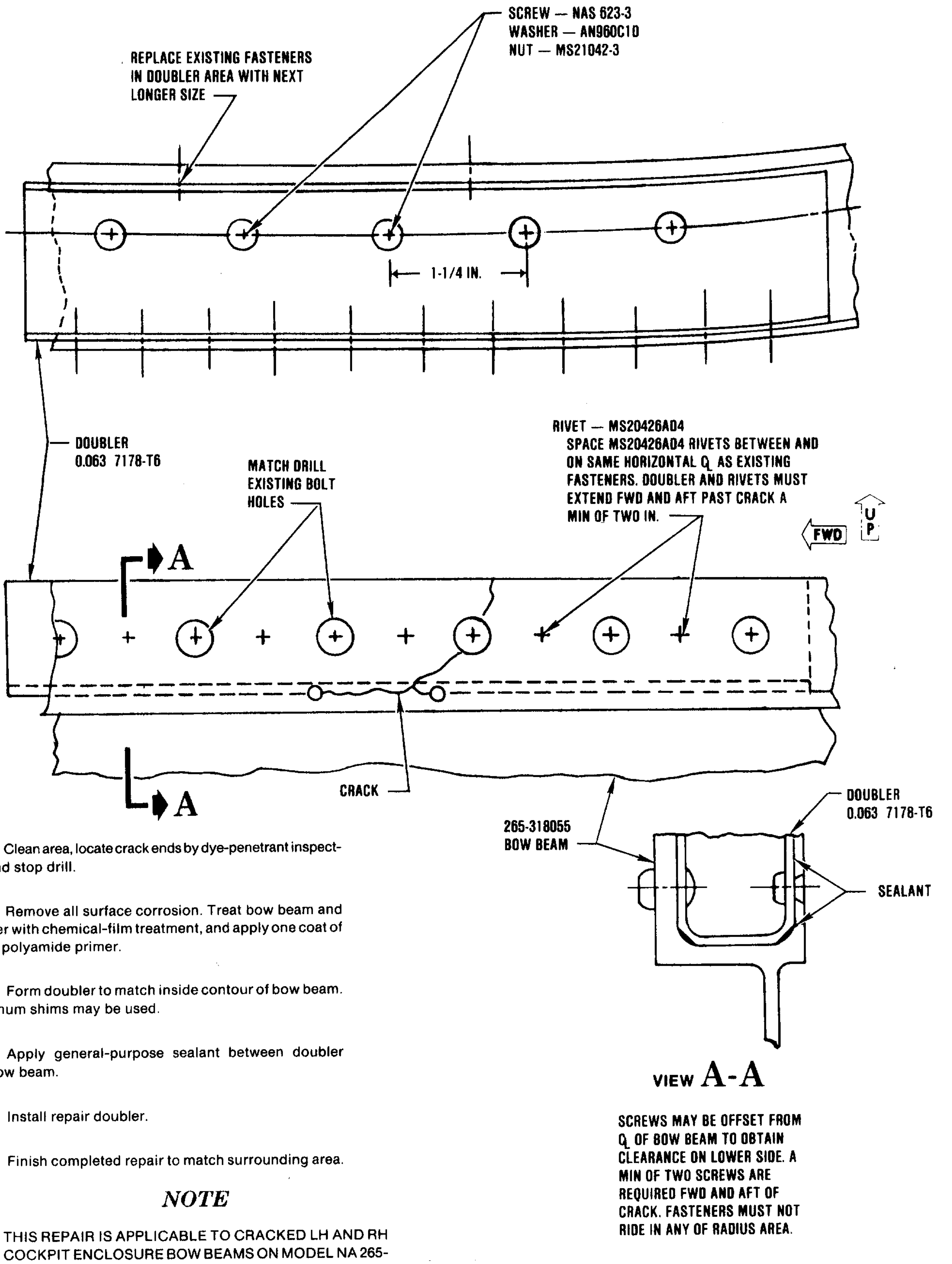
4 Prime all repair parts.

5 Install new longeron section and splice doublers, and rivet in place.

6 Install new frame clips, picking up existing holes in frames.

8265-3-121

Cockpit Enclosure Longeron Repair
Fuselage Stations (FS) 50 to 143
Figure 207 (Sheet 2 of 2)



SCREWS MAY BE OFFSET FROM ℄ OF BOW BEAM TO OBTAIN CLEARANCE ON LOWER SIDE. A MIN OF TWO SCREWS ARE REQUIRED FWD AND AFT OF CRACK. FASTENERS MUST NOT RIDE IN ANY OF RADIUS AREA.

1 Clean area, locate crack ends by dye-penetrant inspection, and stop drill.

2 Remove all surface corrosion. Treat bow beam and doubler with chemical-film treatment, and apply one coat of epoxy polyamide primer.

3 Form doubler to match inside contour of bow beam. Aluminum shims may be used.

4 Apply general-purpose sealant between doubler and bow beam.

5 Install repair doubler.

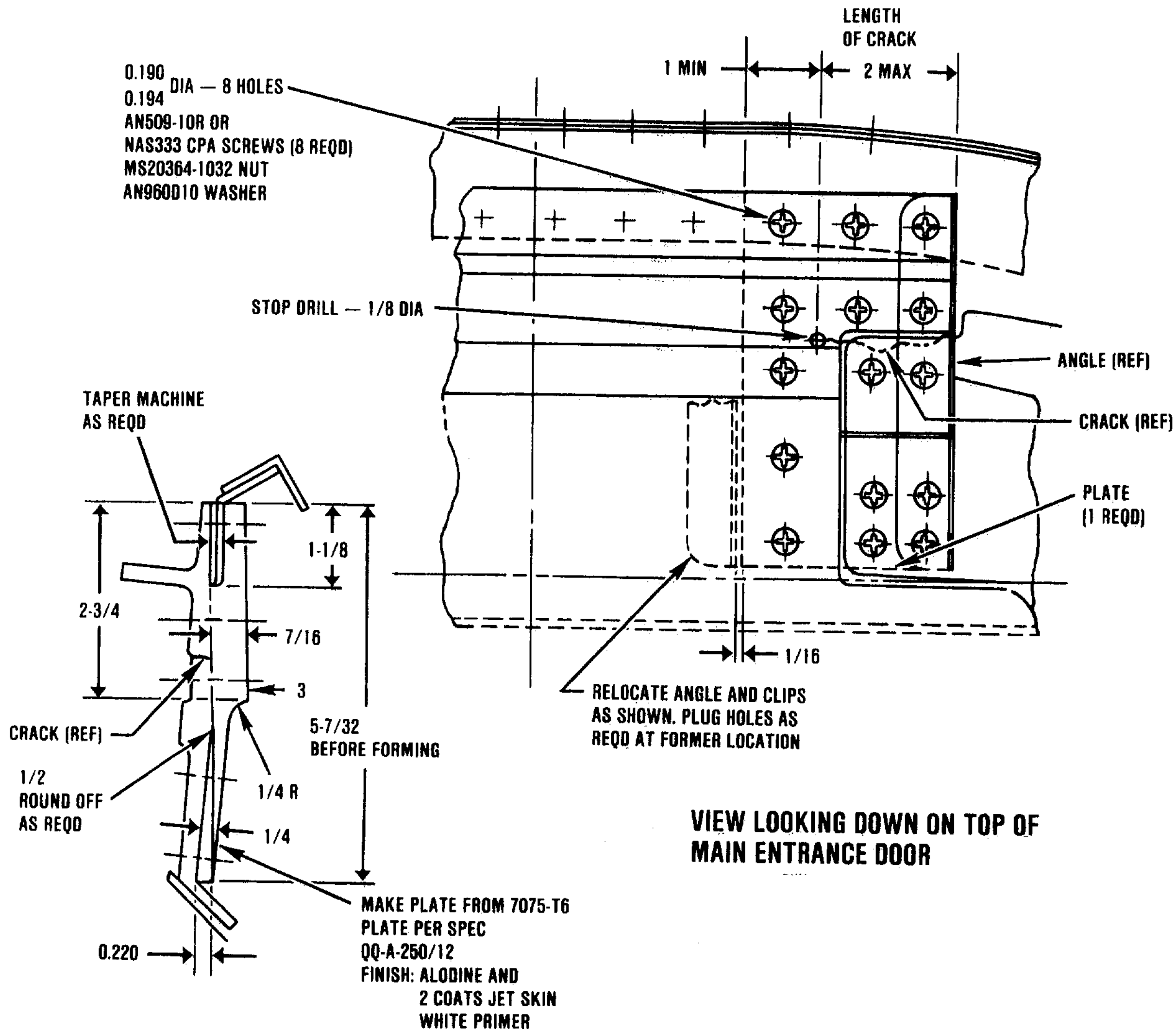
6 Finish completed repair to match surrounding area.

NOTE

THIS REPAIR IS APPLICABLE TO CRACKED LH AND RH COCKPIT ENCLOSURE BOW BEAMS ON MODEL NA 265-40, -60, -70, -80, -80A, AND -80SC.

S370-3-49A

Cockpit Enclosure Bow Repair
Figure 208

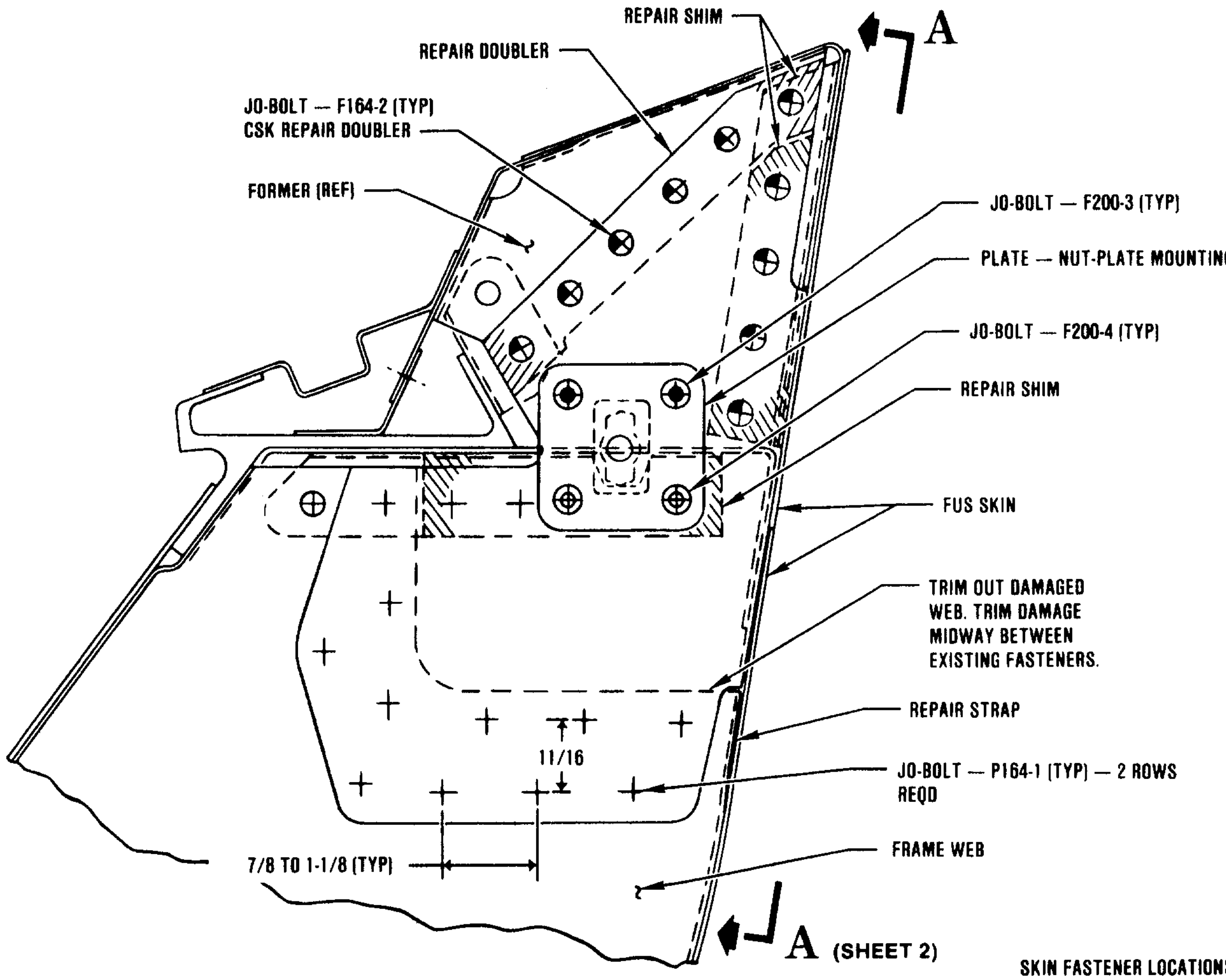


1. Carefully peel seal strips from upper end of door.
2. Remove all sealant and paint from entire length of door stop.
3. Dye-penetrant check extent of crack.
4. Stop drill crack with a No. 30 drill.
5. Fabricate doubler to dimensions given.
6. Install doubler.
7. Prime and paint reworked area with two coats of epoxy polyamide primer.
8. Replace seal strips, using A-4094 primer and MIL-A-25457 adhesive.
9. Readjust door. (Refer to applicable maintenance manual.)

NOTE

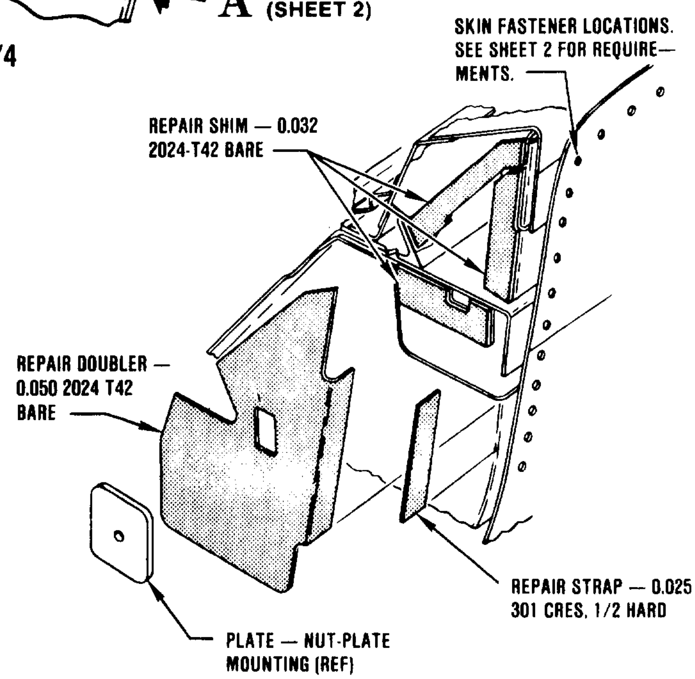
THIS REPAIR IS APPLICABLE TO CRACKED DOOR BEAM.

Main Entrance Door Beam Repair
Figure 209



VIEW LOOKING AFT — LEFT SIDE, FS 161-3/4

1. Remove nut-plate mounting plate.
2. Remove skin fasteners as necessary for access.
3. Trim off damaged frame web as shown.
4. Fabricate and install repair part.
5. Refasten skin panels as shown.
6. Reinstall nut-plate mounting plate.



NOTES

- REPAIR SHOWN ON SHEET 1 IS APPLICABLE TO LOWER FUSELAGE FRAMES AT FS 155-1/4 AND 161-3/4 ON MODEL NA 265-40 S/N 282-1 THRU -5.
- REPAIR SHOWN ON SHEETS 2 THROUGH 5 IS APPLICABLE TO LOWER FUSELAGE FRAMES AT FS 155-1/4 AND 161-3/4 ON MODEL NA 265-40 S/N 282-6 AND LATER.
- REPAIR SHOWN ON SHEET 7 IS APPLICABLE TO LOWER FUSELAGE FRAMES AT FS 155-1/4 AND 161-3/4 ON ALL AIRPLANES.

S265-3-122

**Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 1 of 7)**

1 Remove door hinge angles, beams, and beam-to-frame angles (FS 155-1/4 to 161-3/4).

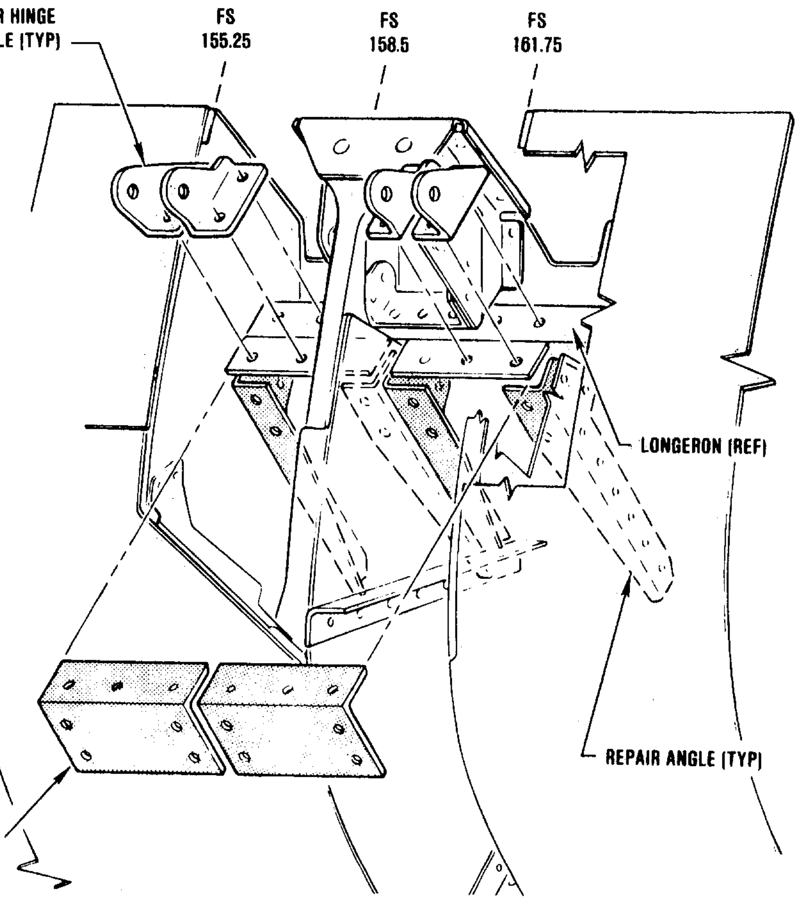
2 Trim out or repair damaged frame webs as applicable. (See sheet 3.)

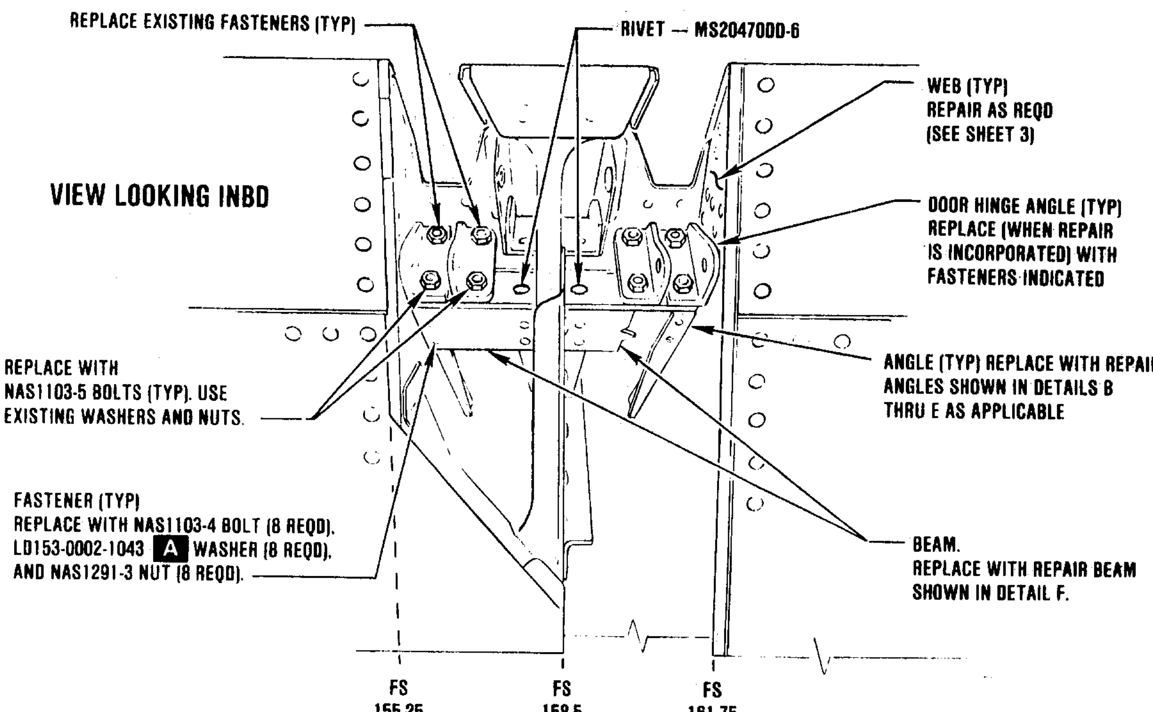
3 Fabricate repair beams and repair angles. Heat-treat repair angles to -T6 condition after forming.

4 Prime repair parts and finish to match surrounding areas.

5 Install repair parts as shown.

6 Reinstall door hinge angles



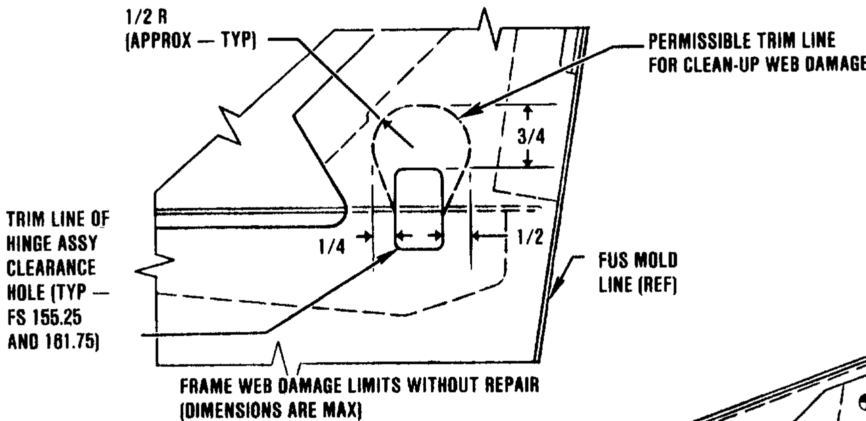


NOTE

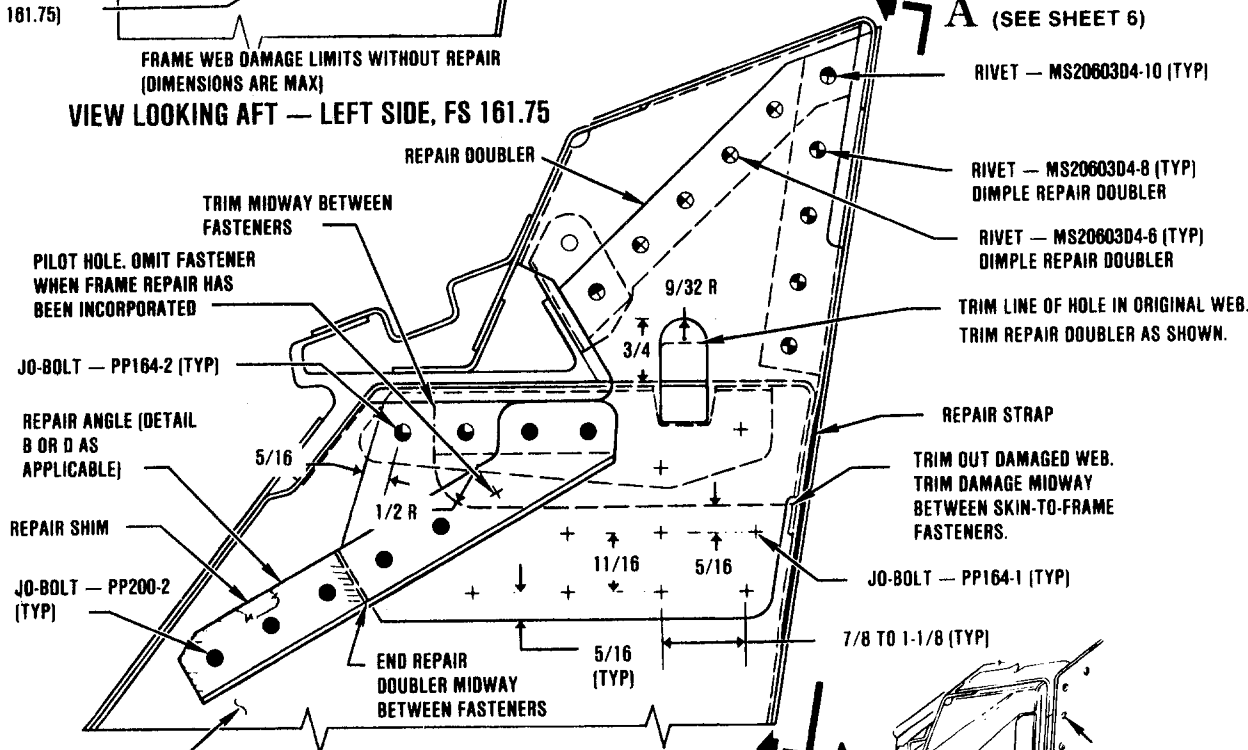
A SABRELINER STANDARD NUMBER. SEE DETAIL G FOR FABRICATION DETAILS.

8265-3-123

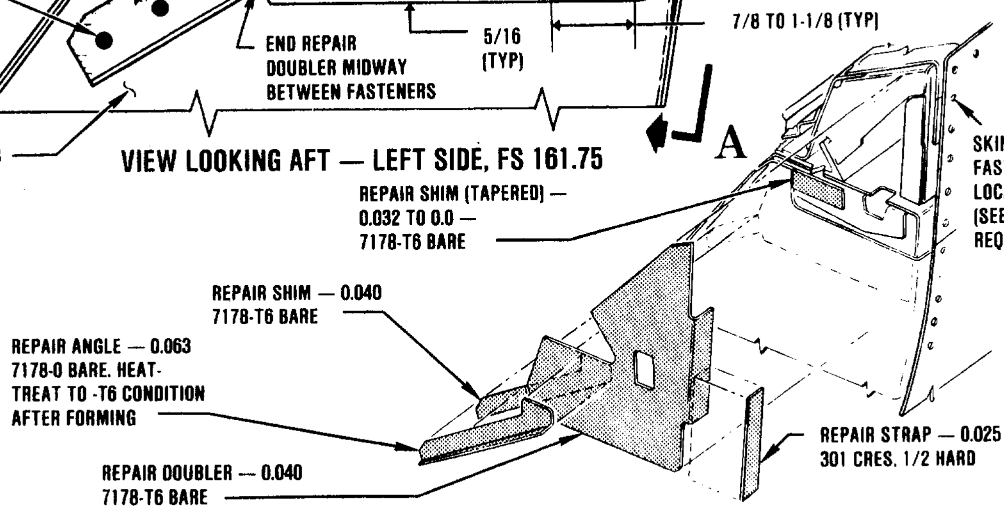
Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 2 of 7)



VIEW LOOKING AFT — LEFT SIDE, FS 161.75



VIEW LOOKING AFT — LEFT SIDE, FS 161.75



NOTE

WHEN FRAMES AT FS 155.25 AND 161.75 ARE DAMAGED IN VICINITY OF DOOR HINGE ASSEMBLY CLEARANCE HOLES, PROCEED AS FOLLOWS:

1. WHEN EXTENT OF DAMAGE PERMITS, TRIM OUT DAMAGE AS SHOWN.
2. WHEN EXTENT OF DAMAGE REQUIRES A REPAIR, REPAIR AS SHOWN ON THIS SHEET. ACCESS FOR REPAIR AND CLOSE-OUT OF REPAIR ARE SHOWN ON SHEET 6.

1 Remove skin fasteners as required for access.

2 Trim off damaged frame end as shown.

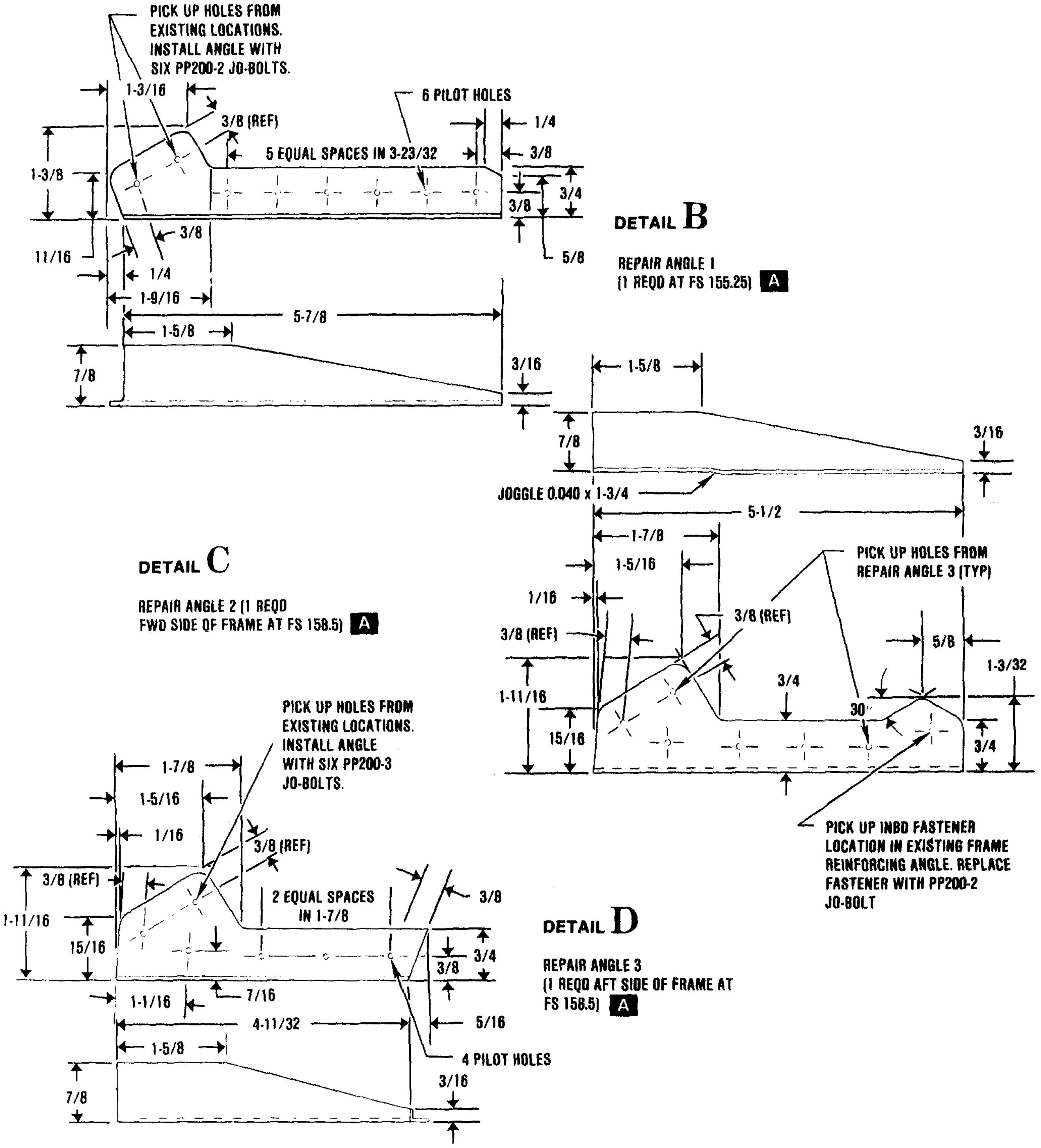
3 Fabricate repair parts.

4 Prime repair parts.

5 Install repair parts and refasten skin panels as shown.

S265-3-124

**Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 3 of 7)**

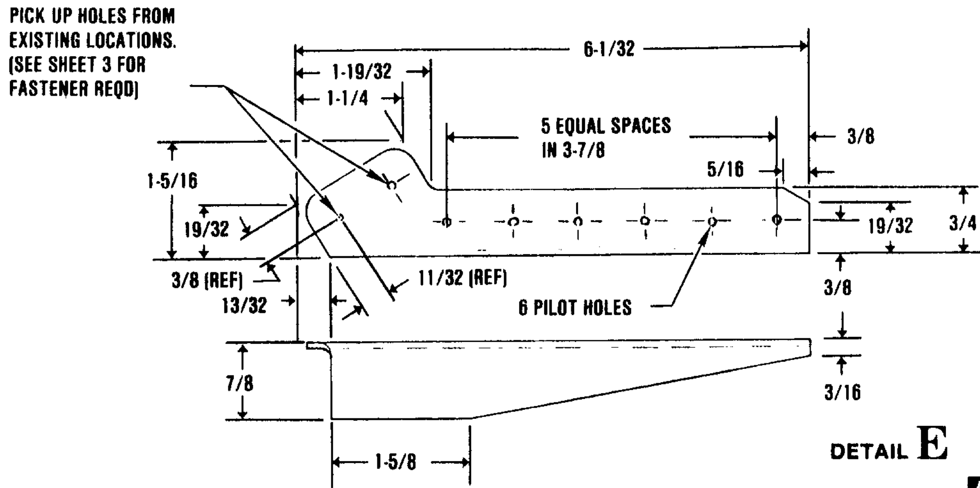


NOTE

A MAKE ANGLES FROM 0.063 7178-O BARE MATERIAL. HEAT-TREAT TO -T6 CONDITION AFTER FORMING. BEND RADIUS IS 1/8 IN.

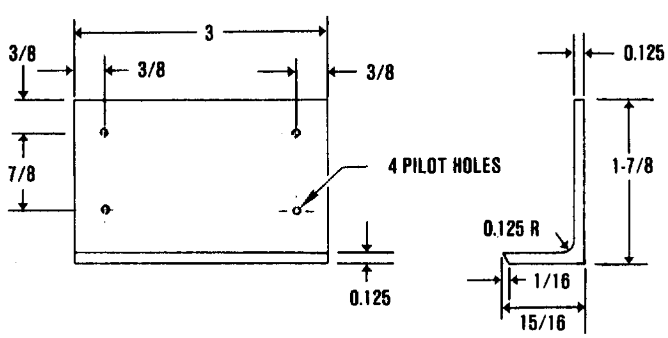
S265-3-125

Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 4 of 7)



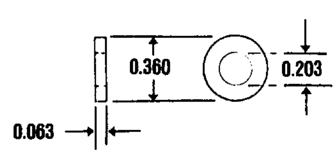
DETAIL E

REPAIR ANGLE 4 A
(1 REQD AT FS 161.75)



DETAIL F

REPAIR BEAM (2 REQD)
MAKE FROM 7178-T6 EXTRUSION OR
MACHINE FROM 7178-T6 BAR



DETAIL G

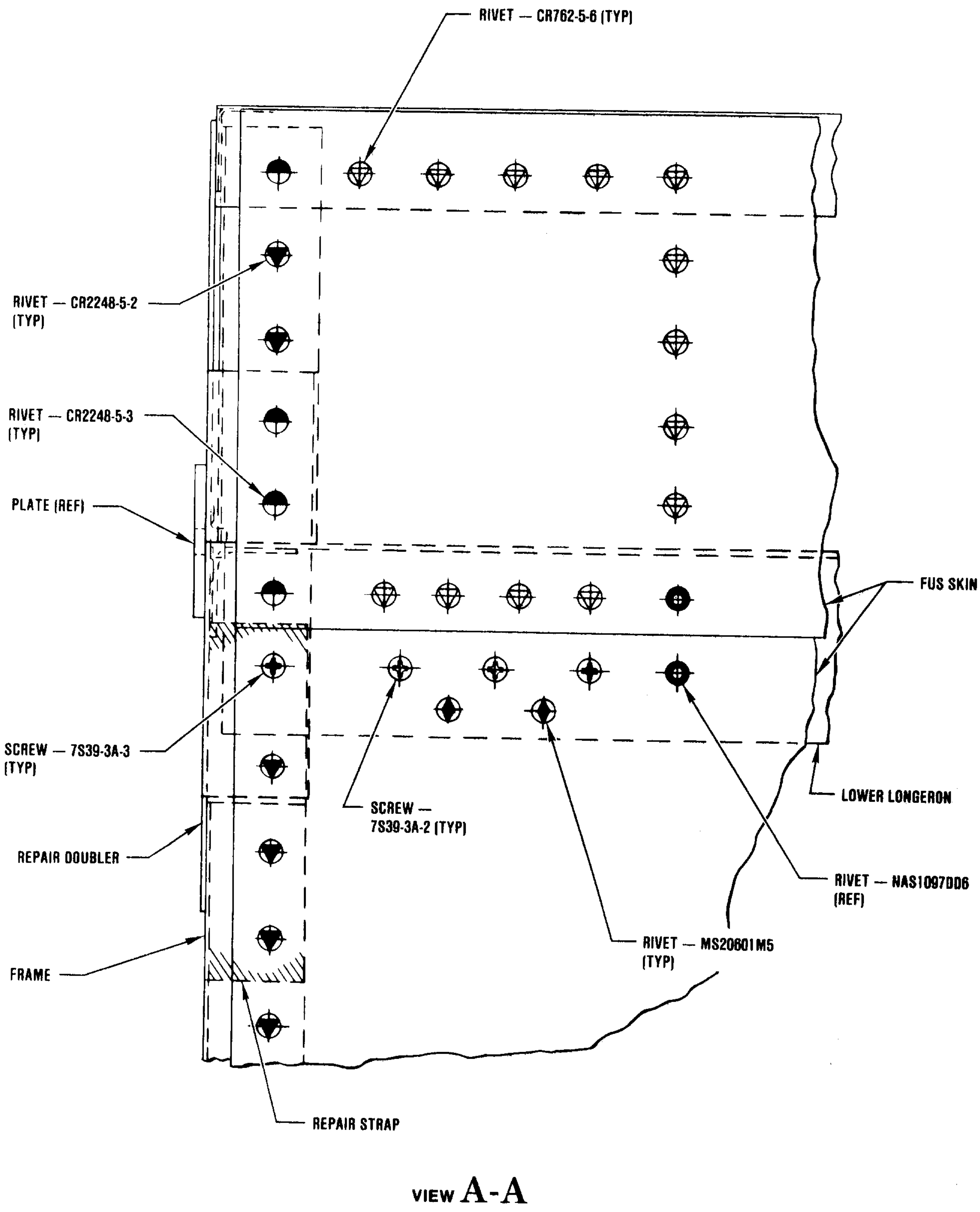
WASHER — LD153-0002-1403 (8 REQD)
MAKE FROM 7178-T6 BARE.
CHEMICAL-FILM-TREAT. (REFER TO SECTION I.)

NOTE

A MAKE ANGLES FROM 0.063 7178-O BARE MATERIAL.
HEAT-TREAT TO -T6 CONDITION AFTER FORMING.
BEND RADIUS IS 1/8 IN.

S265-3-126

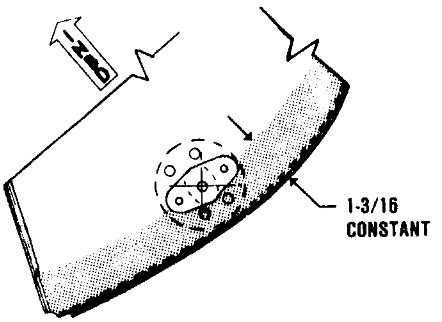
**Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 5 of 7)**

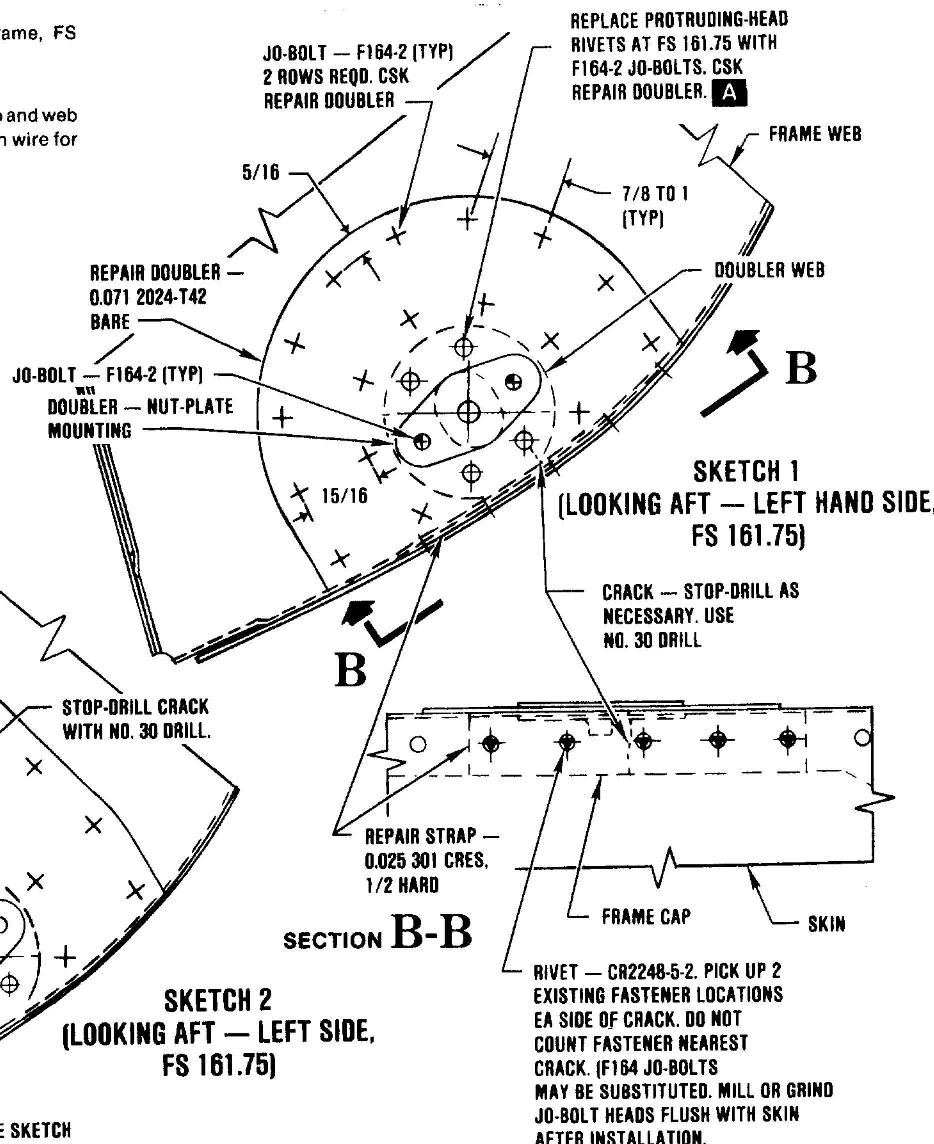


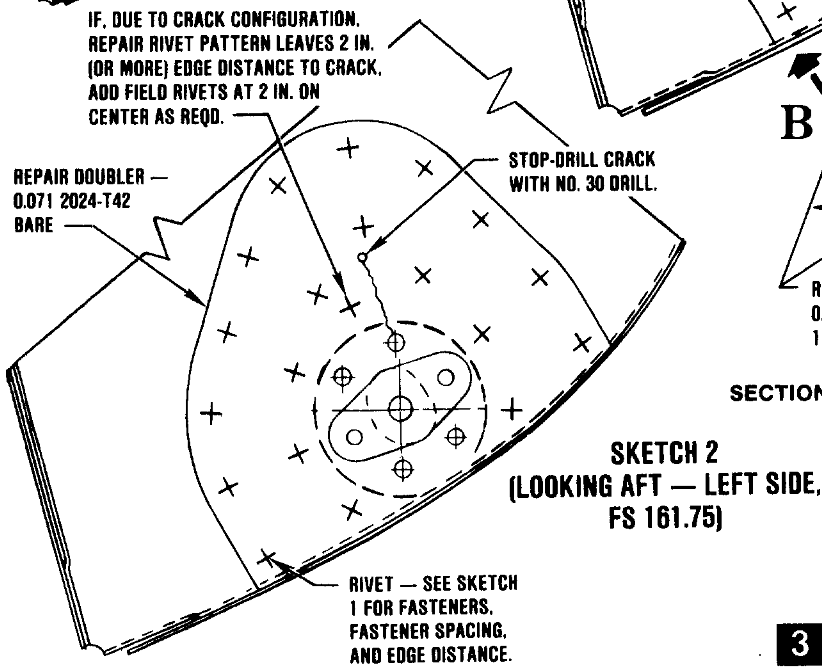
Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 6 of 7)

1 Remove nut-plate mounting doubler (frame, FS 161.75.)

2 Remove protruding-head rivet through web and web doubler (frame, FS 161.75). Hold web doubler with wire for reassembly.)







3 Remove fasteners through skin and frame cap as applicable.

4 Stop-drill crack as applicable.

5 Fabricate repair parts.

6 Prime repair parts.

7 Install repair parts and previously removed parts as applicable.

8 During reinstallation of door, check door trim for clearance in area of repair and retrim if necessary.

CAUTION

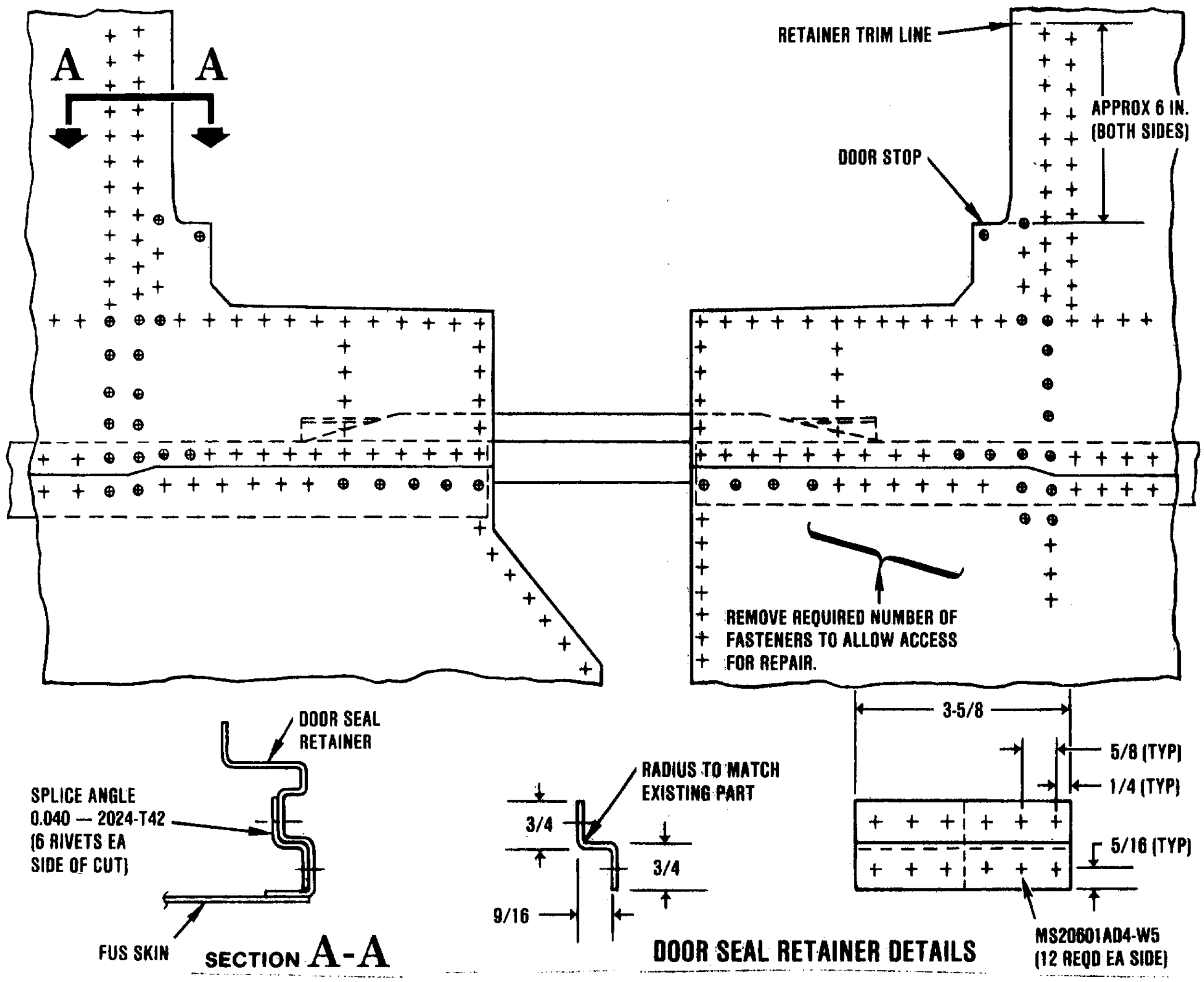
INADEQUATE CLEARANCE WILL RESULT IN DOOR SKIN EDGE BEING TORN.

NOTES

- REPAIRS SHOWN FOR CRACKS ORIGINATING FROM WEB DOUBLER OR NUT-PLATE DOUBLER FASTENERS.
- USE REPAIR SHOWN IN SKETCH 1 WHEN CRACK IS IN SHADED AREA OF WEB.
- USE REPAIR SHOWN IN SKETCH 2 WHEN CRACK IS INBD OF SHADED AREA.
- WHEN CRACK RUNS INBD OF SHADED AREA, REPAIR DOUBLER MUST BE EXTENDED TO PROVIDE FOR TWO ROWS OF FASTENERS AROUND THE CRACK.
- REPAIR STRAP IS NOT REQUIRED IN THIS REPAIR.
- DO NOT REMOVE WEB DOUBLER FOR REPAIR AT FS 158.5.

A DO NOT PICK UP FLUSH RIVETS THROUGH FRAME WEB AND DOUBLER AT FS 158.5.

Frame Repairs — Lower —
Fuselage Stations (FS) 155.25, 158.5, and 161.75
Figure 210 (Sheet 7 of 7)



1 Remove lower trim panels on aft face of bulkhead at FS 143 and fwd face of bulkhead at FS 174 carefully noting method of attachment. Remove entry door, inflatable seal and lower hinge mechanism. Refer to applicable Maintenance Manual.

2 Cut door seal retainer midway between existing fasteners as shown.

3 Remove all fasteners (below cut) securing door seal retainer to fuselage structure and skin.

4 Remove lower section of door seal retainer, and all excess sealant.

5 Remove sufficient fasteners through fuselage skins to allow access for installation of longeron repair angle and fillers.

6 Make longeron repair angle and fillers as shown on sheet 3.

7 Install longeron repair angle and fillers as shown on sheet 2.

8 Install splice sections at each end of installed door seal retainer with six MS20601AD4-W5 rivets.

9 Replace removed fasteners through fuselage skins. See figure 210 for substitute fasteners.

10 Reinstall removed section of door seal retainer with fasteners as indicated on Sheet 4. Install six MS20601AD4-W5 rivets through lower section of door seal retainer and door seal retainer splice.

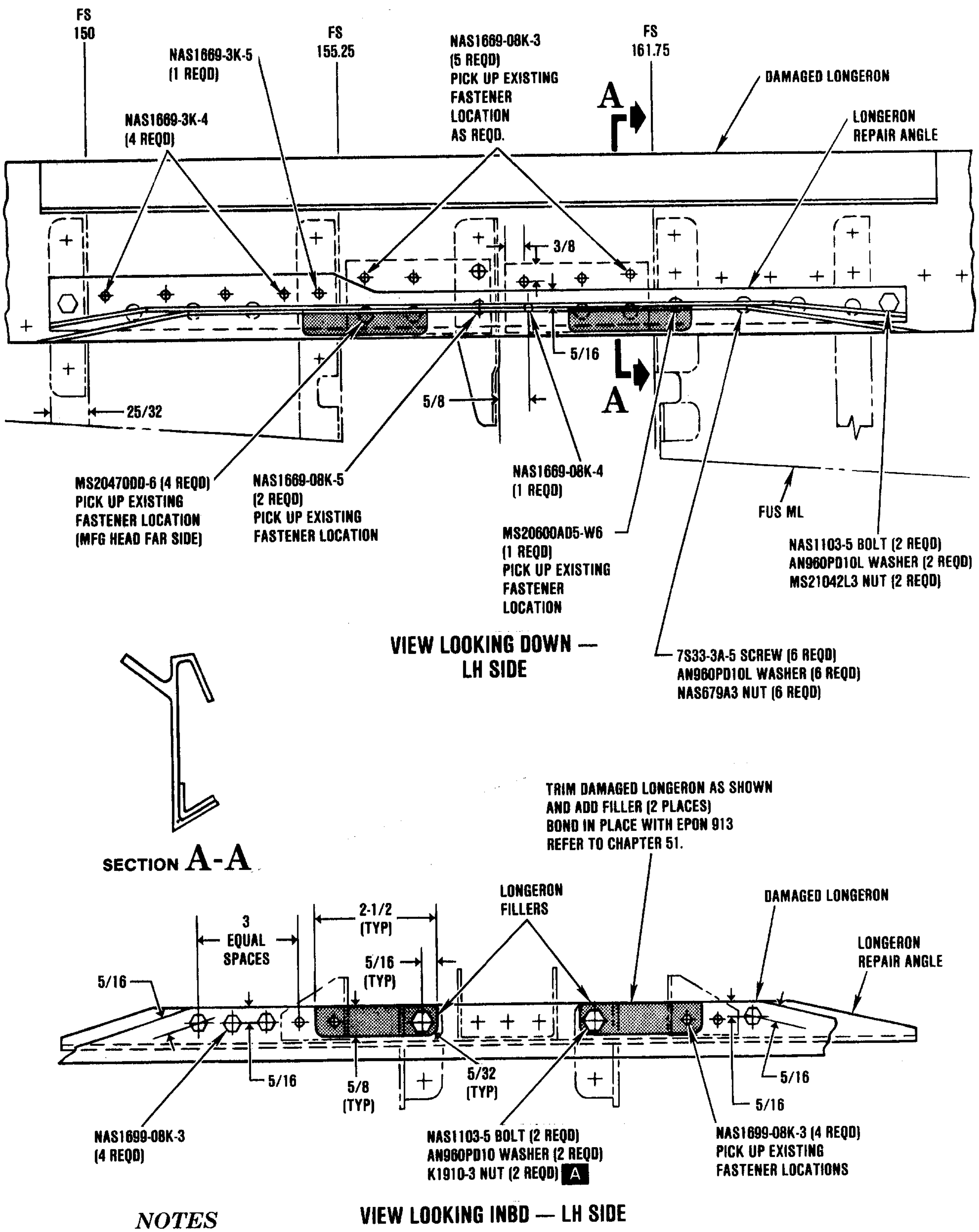
11 Reseal removed section of door retainer including door seal retainer splice. Refer to Chapter 51 for sealing procedures.

12 Install trim panels on FS 143 and 174 bulkhead. Use same method of attachment as on original installation.

13 Reinstall inflatable door seal, entry door and hinge mechanism. Refer to applicable Maintenance Manual.

8265-3-129

Lower Longeron Repair at Entrance Door Opening
Figure 211 (Sheet 1 of 4)



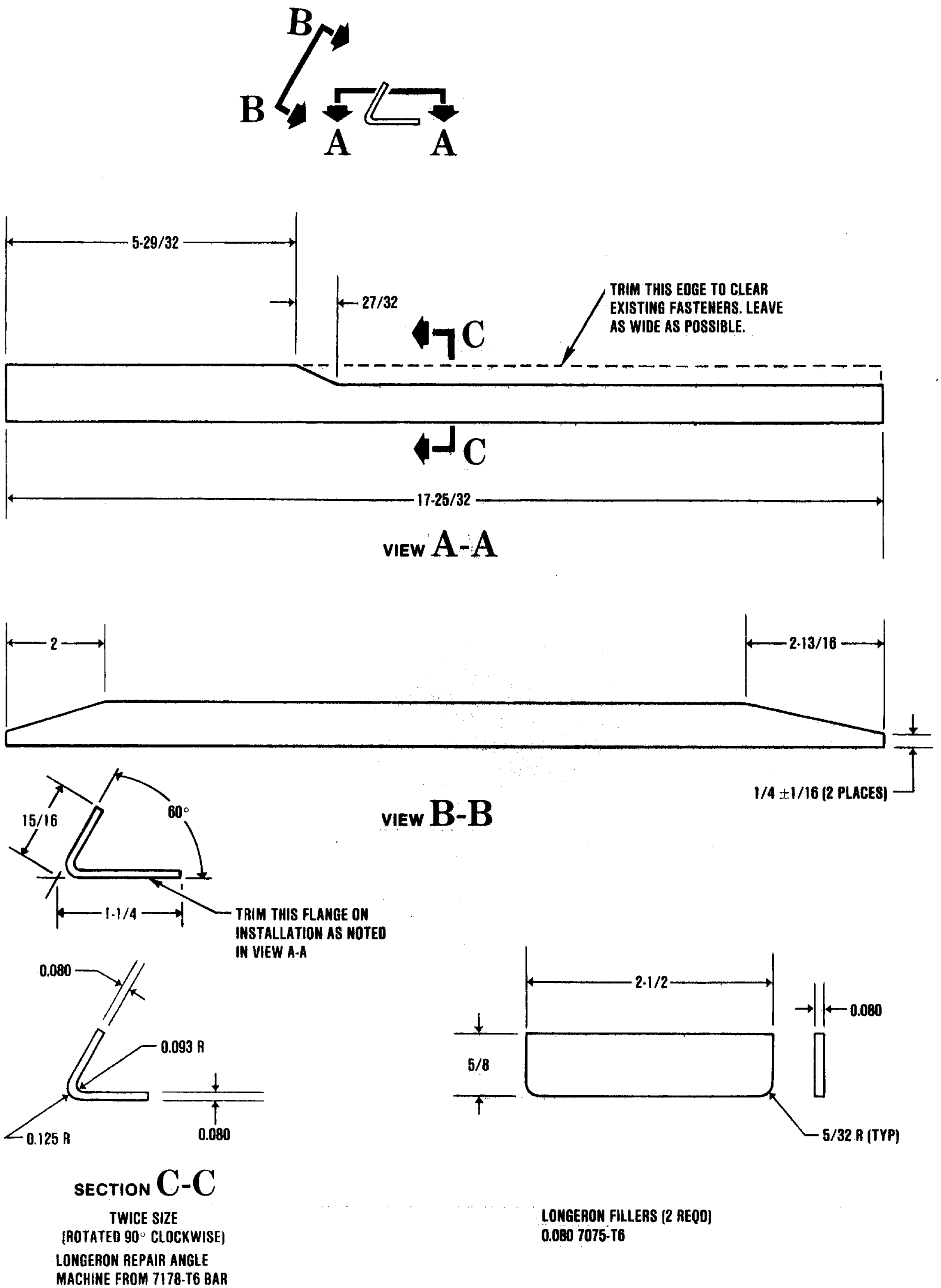
NOTES

SEE SHEET 3 FOR DETAILS OF REPAIR PARTS.

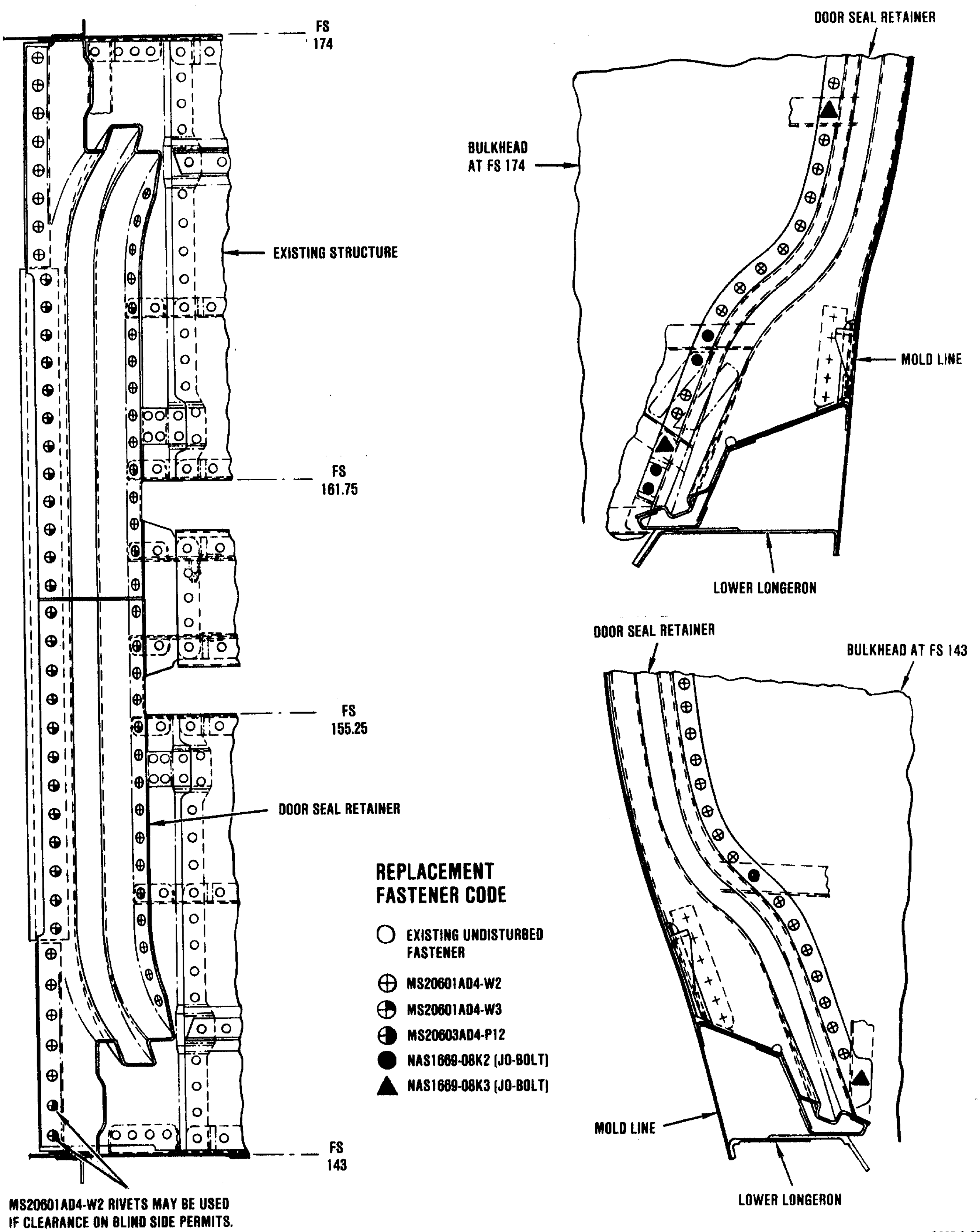
A KAYNAR MFG CO., INC. — FULLRTON, CALIF

S265-3-130

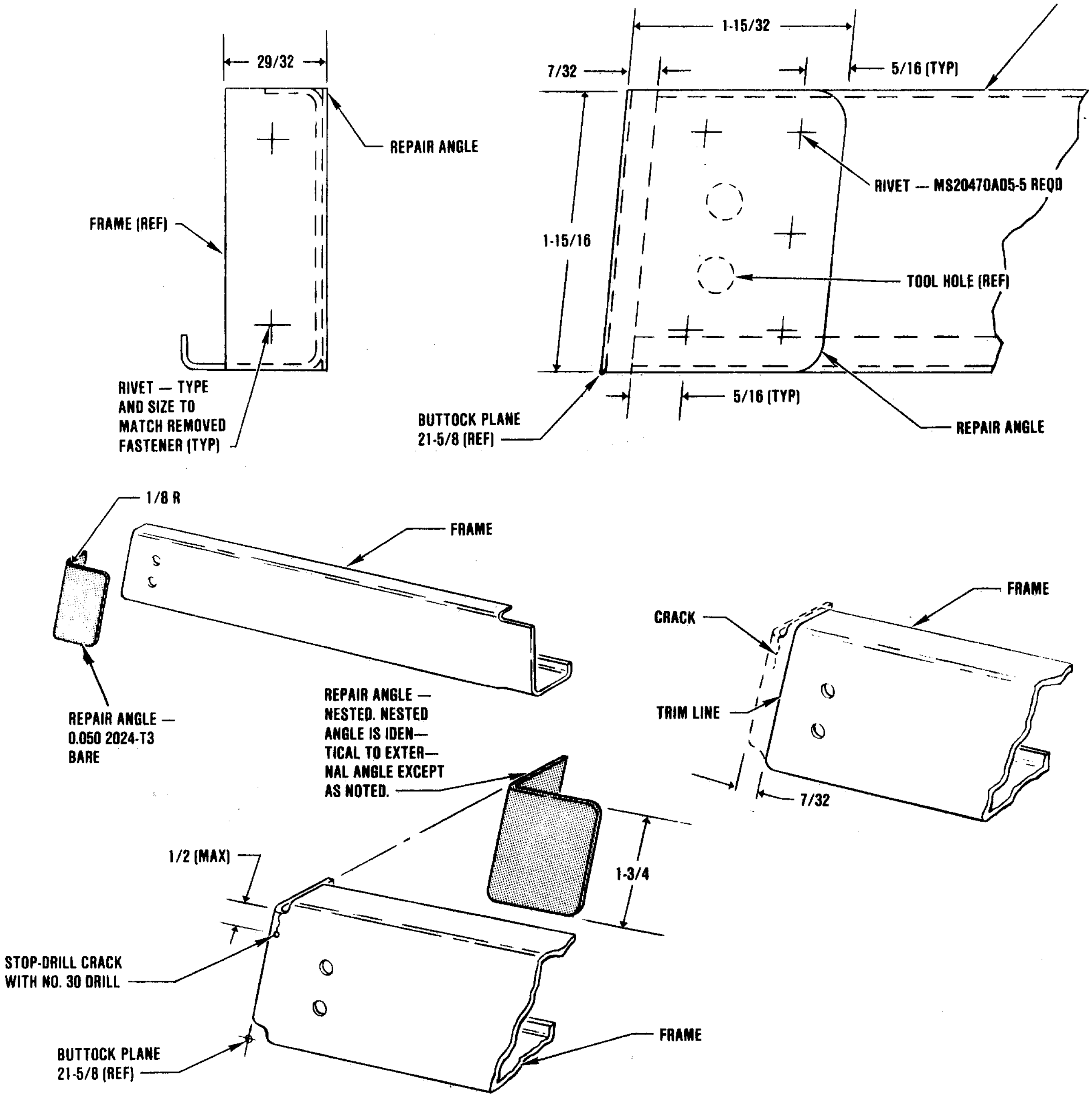
Lower Longeron Repair at Entrance Door Opening
Figure 211 (Sheet 2 of 4)



Lower Longeron Repair at Entrance Door Opening
Figure 211 (Sheet 3 of 4)



Lower Longeron Repair at Entrance Door Opening
Figure 211 (Sheet 4 of 4)



NOTES

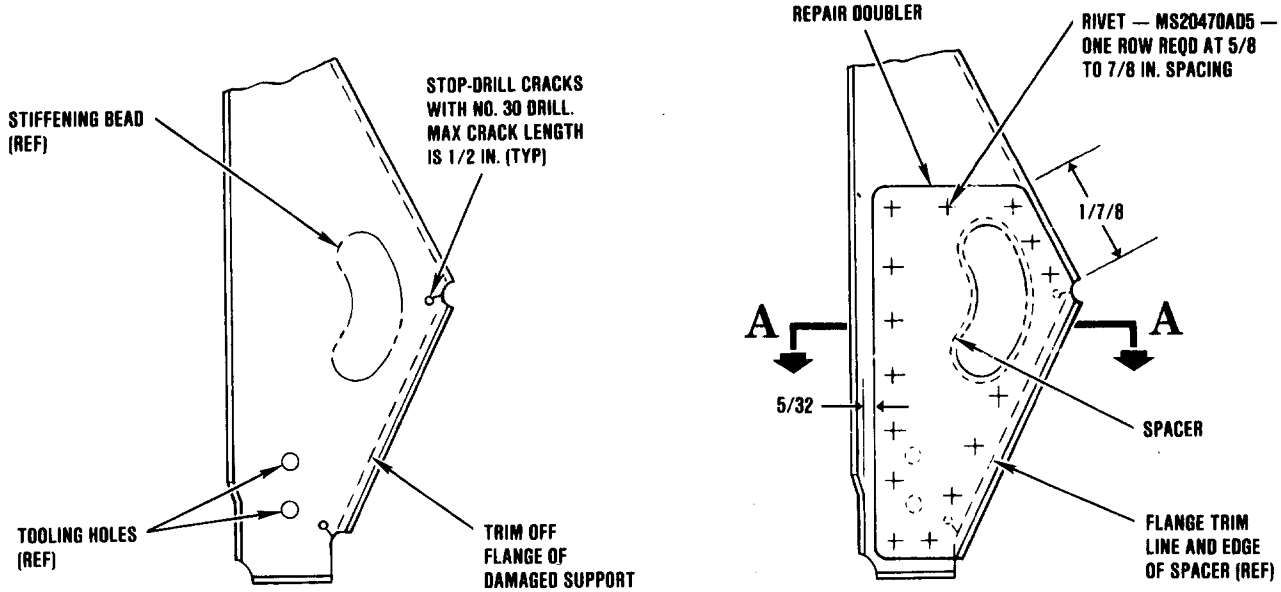
- THIS REPAIR IS APPLICABLE TO CRACKED FRAMES AT FS 188.25, BUTTOCK PLANES 10 TO 21.625.
- FRAME MAY BE REPAIRED BY TRIMMING OFF DAMAGED END AND REPLACING IT WITH AN EXTERNAL REPAIR ANGLE OR BY STOP-DRILLING CRACK AND NESTING A REPAIR ANGLE INSIDE FRAME FLANGES IF CRACK IS WITHIN LIMITS SHOWN.

1 Trim off damaged frame end or stop-drill crack as applicable.

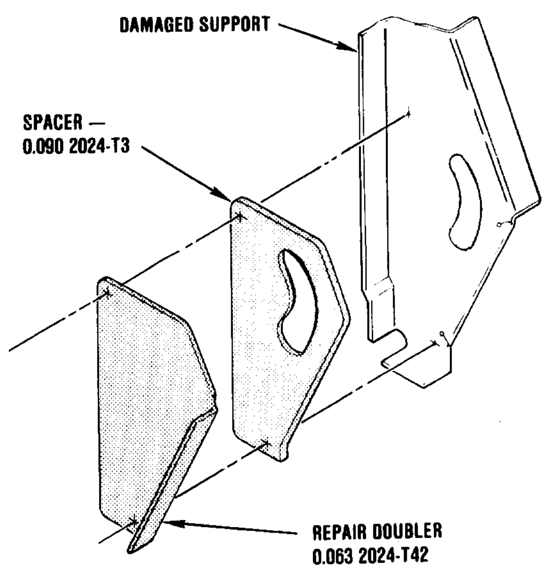
2 Fabricate repair angle.

3 Install repair angle.

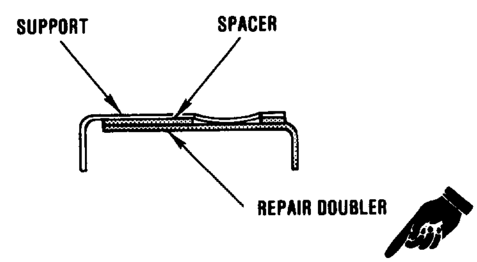
Frame Repair — Aft Side of Speed Brake Well, Station 188.25
Figure 212



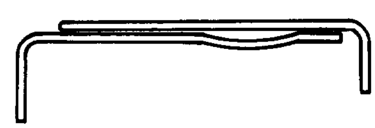
VIEW LOOKING FORWARD AT WING FILLET SUPPORT — TYPICAL



SECTION A-A



Section A-A Alternate Method



1. Stop-drill cracks(s).
2. Trim off flange.
3. Fabricate spacer and repair doubler. Form repair doubler in annealed condition and heat-treat to -T42 condition after forming.
4. Paint spacer, repair doubler, and bare areas of support with two coats of epoxy polyamide primer.
5. Install repair parts.

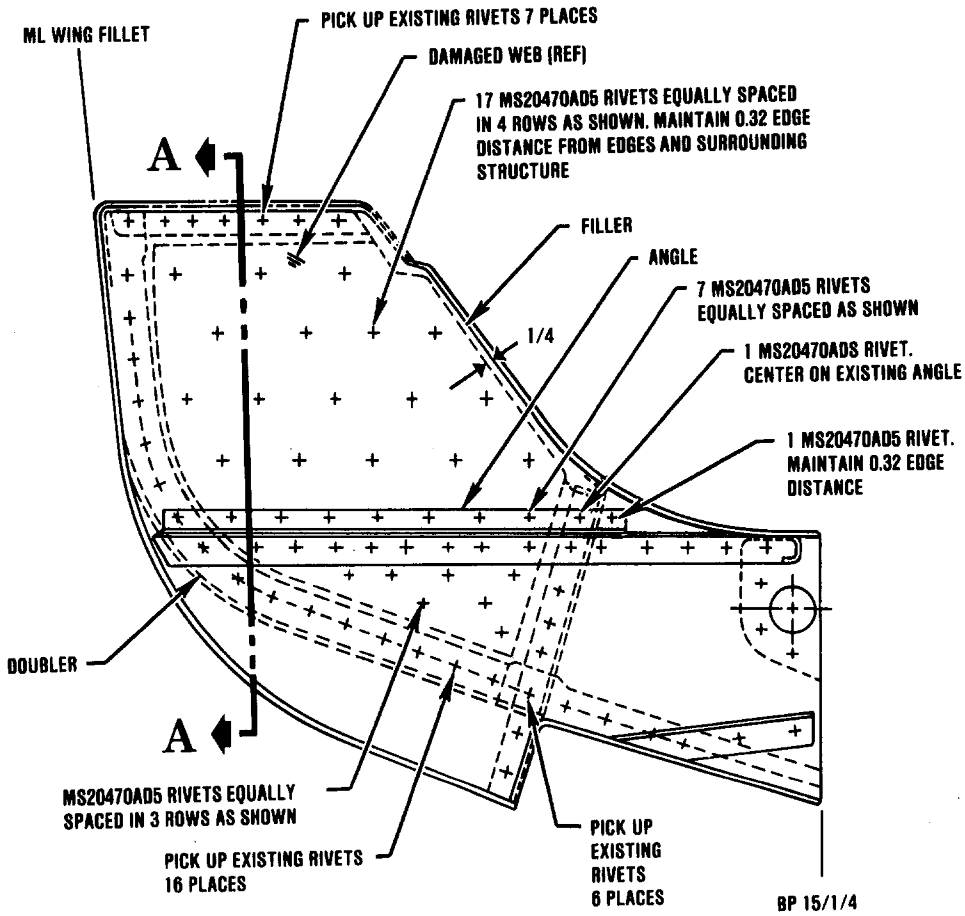
Alternate repair method is identical except delete spacer and install repair doubler on the opposite side of stiffener bead protrusion.

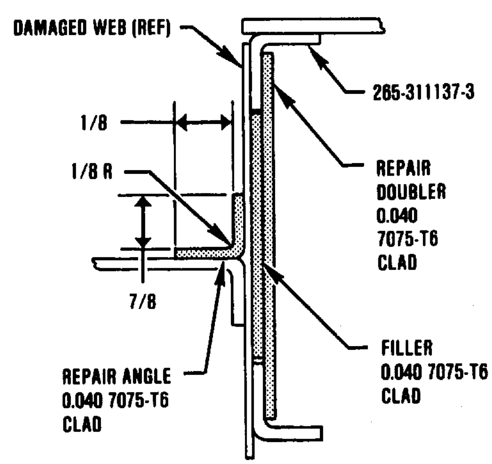
NOTE

This repair is applicable to cracked fillet supports at FS 215.5, 224.5, 233.5, 242, and 249.125.

S265-3-213

Figure 213 — Repair of Fillet Supports — Fuselage (FS) Station 215.5 to 249.125





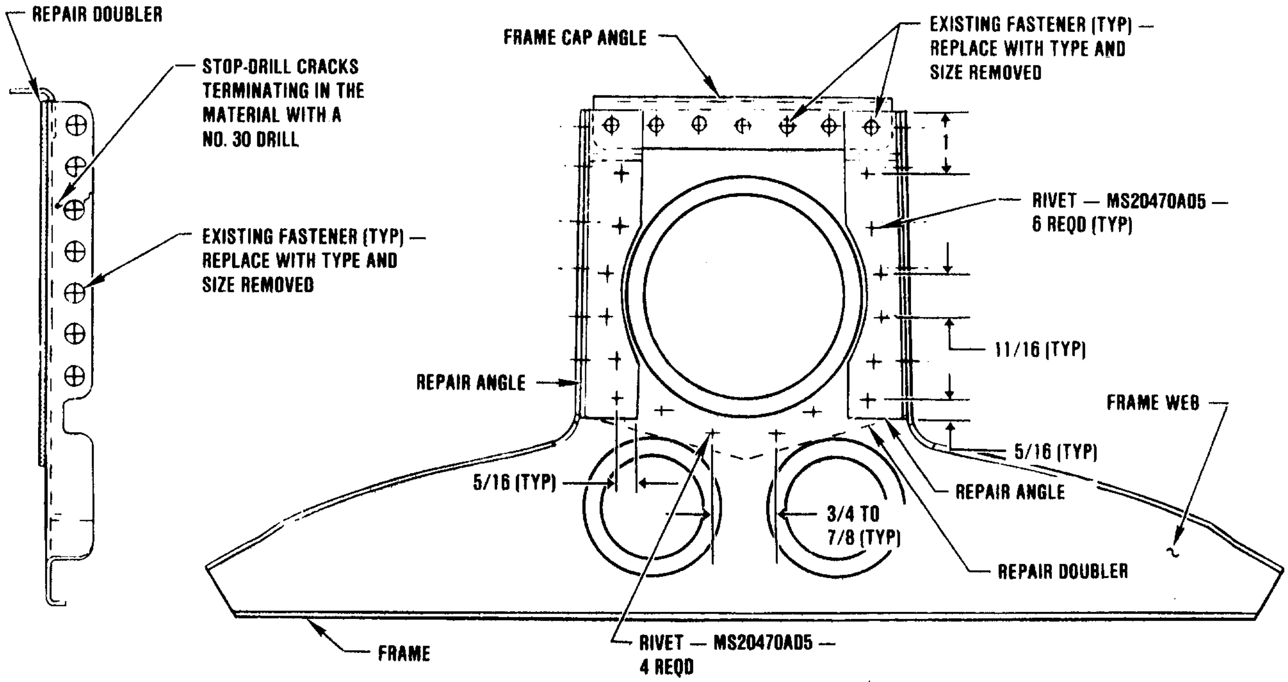
SECTION A-A

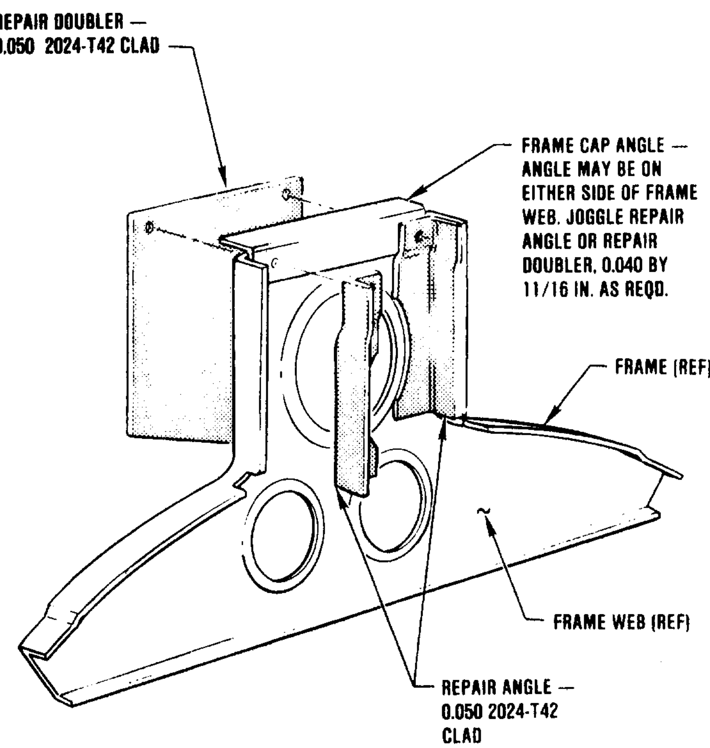
1. Trim doubler, filler and angle to fit.
2. Maintain 1/4 in. edge distance between edge of filler and surrounding structure.
3. Prime repair doubler, filler, and repair angle with one coat of epoxy polyamide prior to installation.
4. Form angle in 7075-0 condition; then heat-treat to 7075-T6 condition.
5. Seal entire repair area.

NOTES

- THIS REPAIR IS FOR CRACKS OF ONE IN. OR LESS. FOR REPAIR OF CRACKS GREATER THAN ONE IN. REFER TO S/B 56.
- DIMENSIONS IN INCHES.

Repair of Frame and Web at Fuselage Station (FS) 166.25
Figure 214





1 Stop-drill cracks.

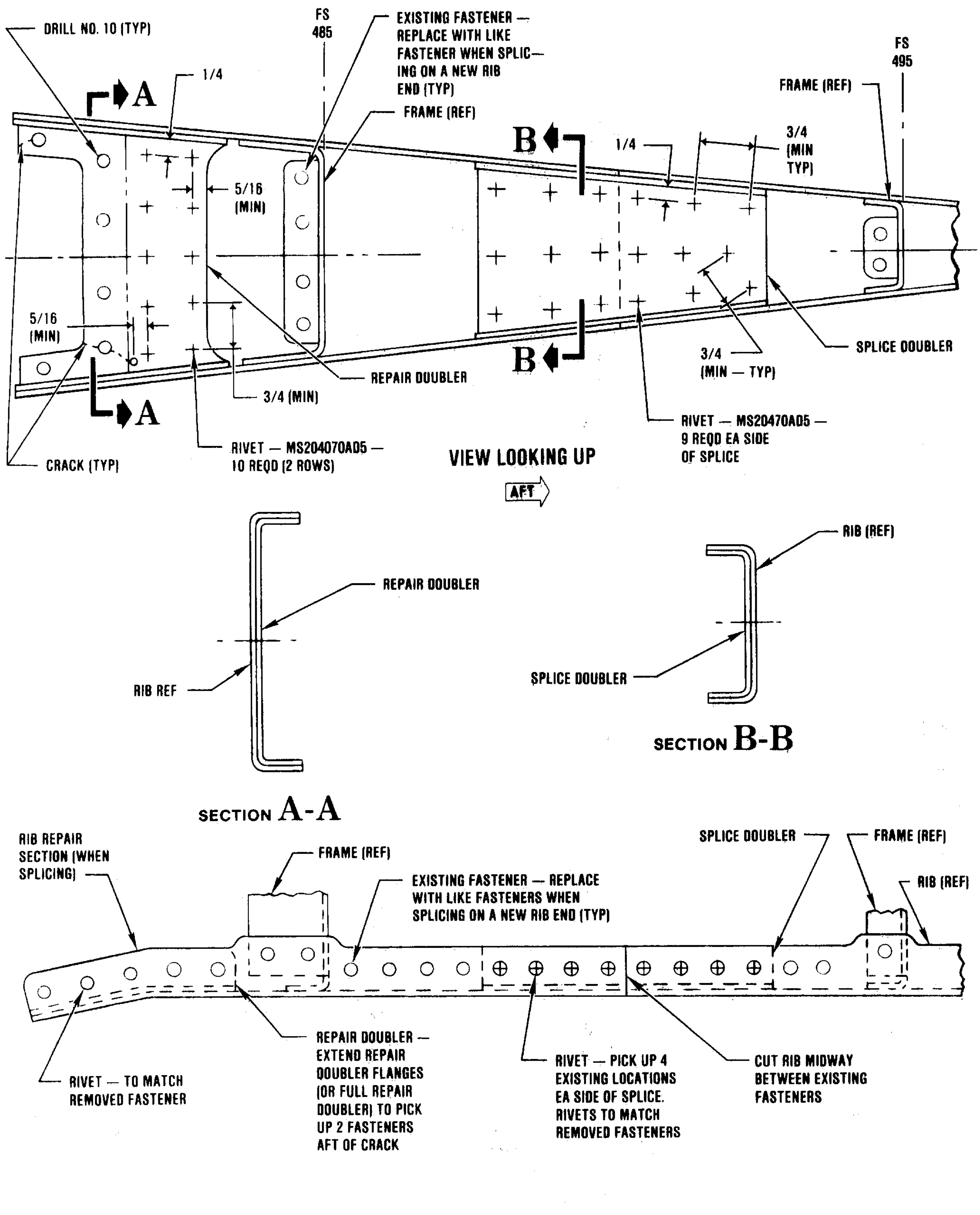
2 Fabricate repair parts.

3 Install repair parts as shown.

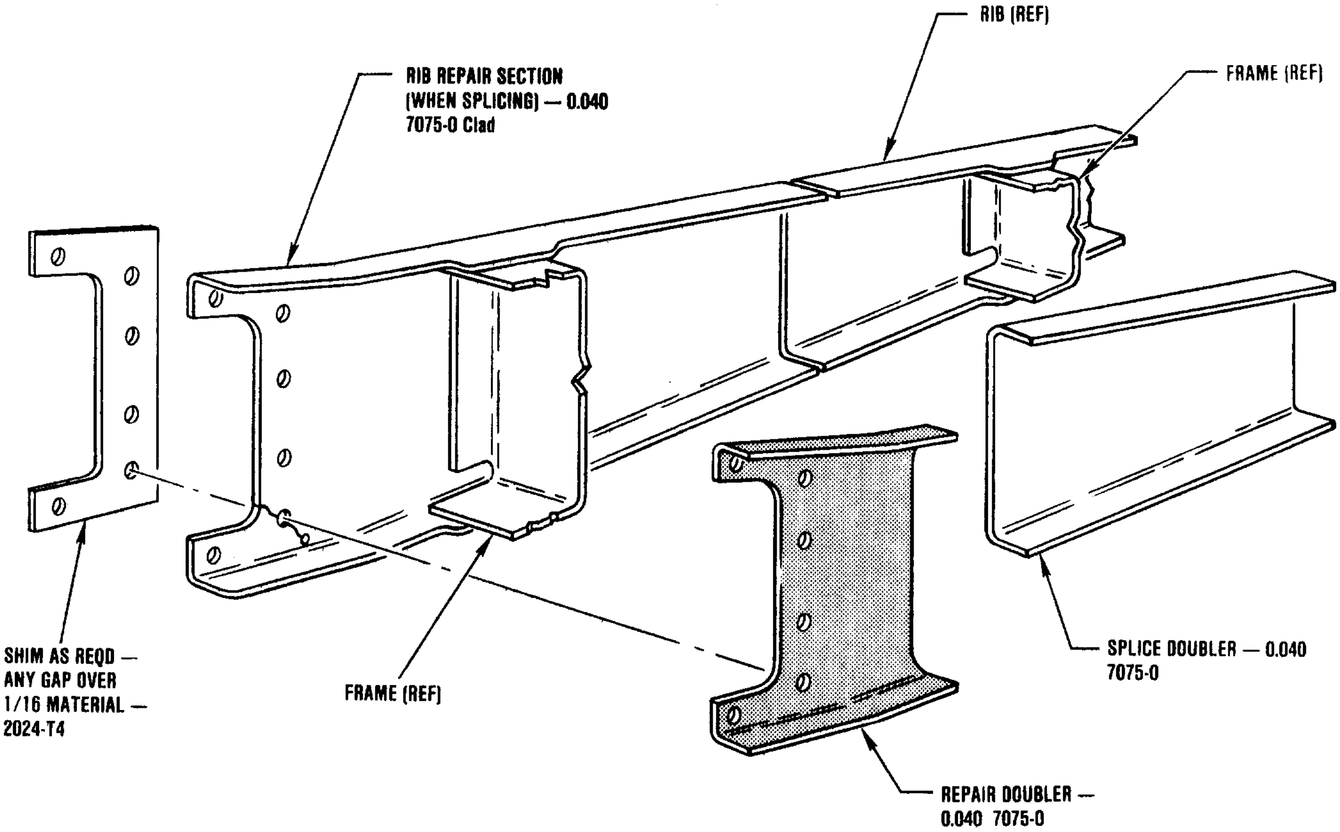
NOTES

- THESE REPAIRS ARE APPLICABLE TO FUSELAGE FRAME, CANTED FUSELAGE STATION 469.75, AS FOLLOWS:
- CRACKS THAT RUN TO OUTER EDGE OF FRAME FLANGE AND CRACKS THAT RUN TOWARD, BUT NOT INTO, FLANGE RADIUS MAY BE REPAIRED BY INSTALLATION OF REPAIR ANGLES.
- IT IS RECOMMENDED THAT REPAIR ANGLES BE INSTALLED ON BOTH SIDES OF FRAME AT INITIAL FAILURE (THOUGH THE SECOND SIDE MAY NOT BE CRACKED).
- CRACKS THAT RUN INTO, OR PAST, FLANGE RADIUS MUST BE REPAIRED BY INSTALLATION OF BOTH REPAIR ANGLES PLUS REPAIR DOUBLER.

Frame Repair — Canted Fuselage Station (CFS) 469.75
Figure 215



Upper Close-out Rib Repair — Fuselage Station (FS) 479 - 500
Figure 216 (Sheet 1 of 2)



RIB END REPAIR

1 Stop-drill cracks terminating in rib with a No. 30 drill.

2 Fabricate repair doubler.

3 Heat-treat repair doubler to -T6 condition.

4 Install repair doubler. Check gap before fastening rib to rudder lower hinge support. Shim gap in excess of 1/64 in. to avoid preloading parts.

NOTES

- THESE REPAIRS ARE APPLICABLE TO THE DAMAGED CLOSE-OUT RIB AT FS 479 TO 500.
- USE RIB END REPAIR WHEN FOLLOWING CONDITIONS EXIST:
  - (1) TWO EXISTING SKIN-TO-RIB FASTENERS CAN BE PICKED UP IN REPAIR DOUBLER AFT OF CRACK AND FWD OF FRAME AT FS 485.
  - (2) TWO ROWS OF FASTENERS CAN BE INSTALLED THROUGH RIB WEB AFT OF CRACK AND FWD OF FRAME AT FS 485.
- USE SPLICE WHEN DAMAGED CONDITION DOES NOT ALLOW USE OF RIB END REPAIR.

RIB SPLICE

1 Remove rib-to-skin fasteners as required.

2 Remove rib-to-frame fasteners at FS 485.

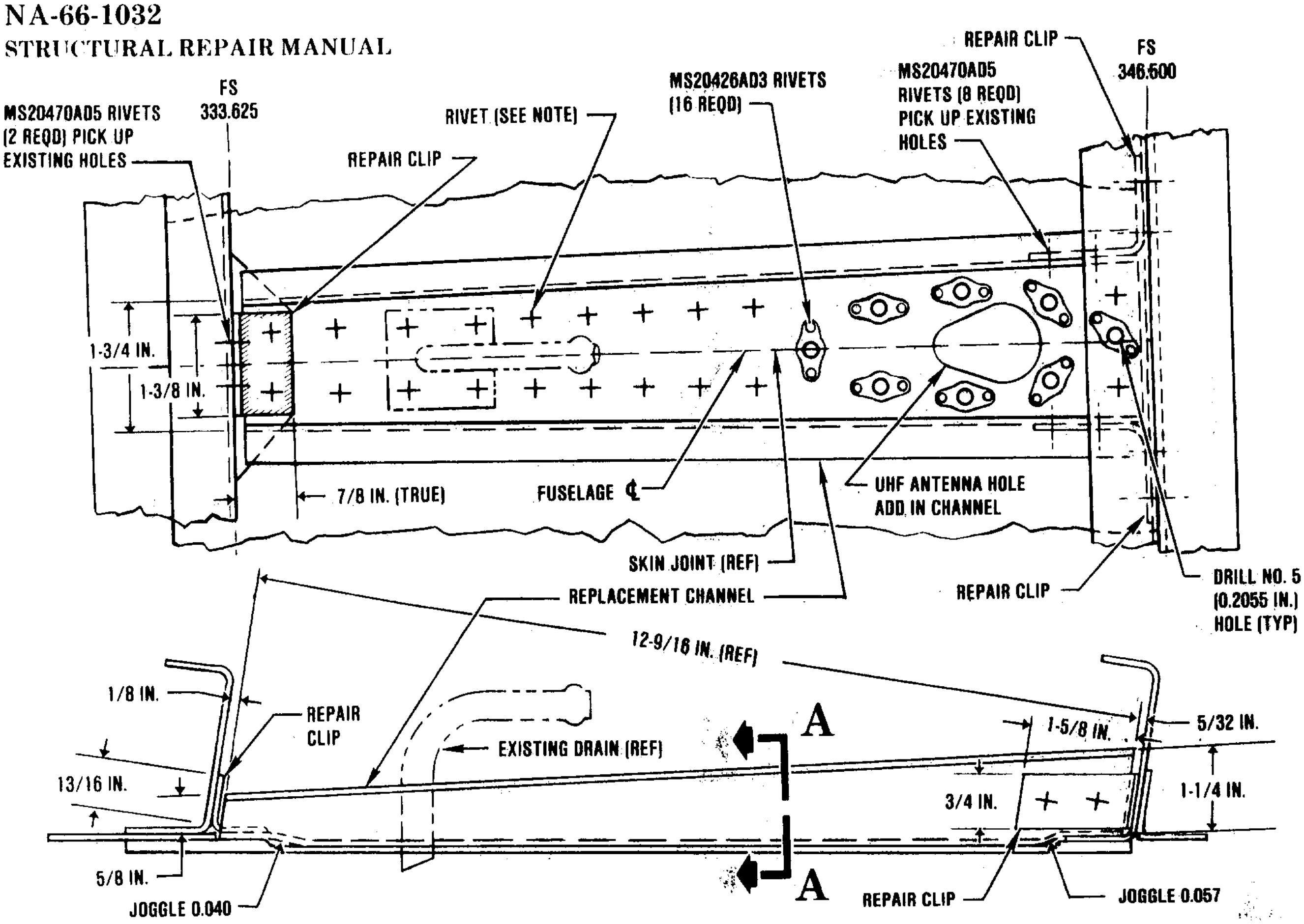
3 Trim off damaged rib end.

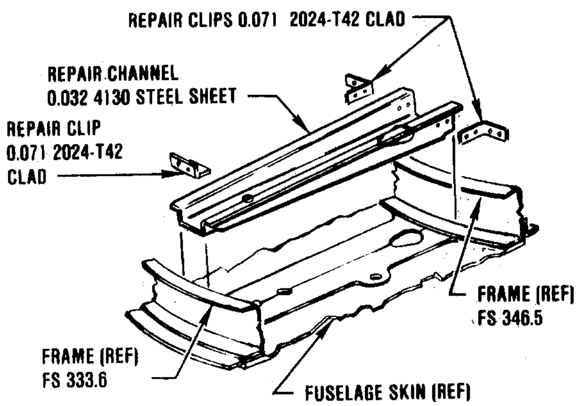
4 Fabricate rib repair section and splice doubler.

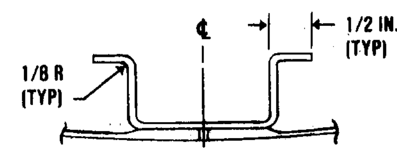
5 Heat-treat repair parts to -T6 condition.

6 Install rib repair section and repair doubler. Align rib repair section so that a maximum gap of 1/64 in. exists between that section and rudder lower hinge support when fastener edge distance and alignment with other parts permits. When foregoing tolerance cannot be met, shim gap in excess of 1/64 in.

Upper Close-out Rib Repair — Fuselage Station (FS) 479 - 500
Figure 216 (Sheet 2 of 2)







SECTION A-A

NOTES

- THIS REPAIR IS APPLICABLE TO CRACKED UHF ANTENNA BRACKETS, FUSELAGE LOWER CENTERLINE BETWEEN FS 333.625 AND 346.500.
- IT IS RECOMMENDED THAT SKIN REPAIR SHOWN ON SHEET 2 BE INCORPORATED WHEN A NEW (REPAIR) ANTENNA SUPPORT CHANNEL IS INSTALLED. CONDITIONS THAT CAUSED CHANNEL TO CRACK ARE LIKELY TO HAVE DAMAGED SKINS IN AREA OF CHEM-MILLED RADII ALONG CENTERLINE LAND.
- WHEN A SKIN REPAIR IS NOT INCORPORATED WITH CHANNEL REPAIR, REPLACEMENT FASTENERS MUST BE OF TYPE AND SIZE REMOVED. WHEN SKIN REPAIR IS INCORPORATED, USE FASTENERS CALLED OUT ON SHEET 2.

1 Remove cracked channel.

2 Fabricate repair channel, and repair clips.

3 Heat-treat repair clips to T-42 condition after forming.

4 After forming repair channel, heat-treat to 125,000 -135,000 psi, and cadmium plate.

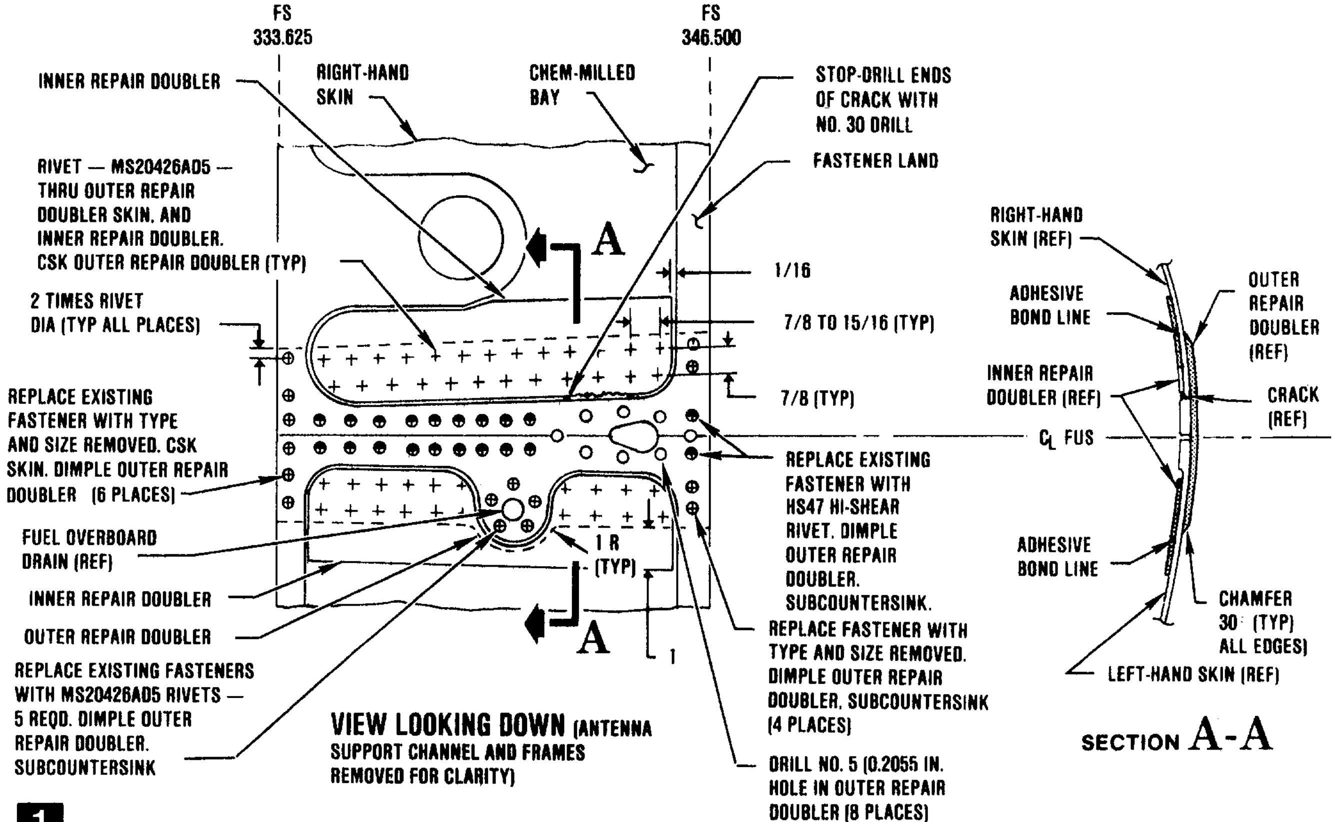
5 Use barrier tape between repair channel and skin, and repair clips.

6 Dip fasteners in zinc chromate primer, and install wet.

7 Reinstall eight existing nut plates.

8 Paint antenna support installation to match surrounding area.

UHF Antenna Support and Adjacent Skin Repair
Figure 217 (Sheet 1 of 2)



1 Stop-drill ends of crack(s).

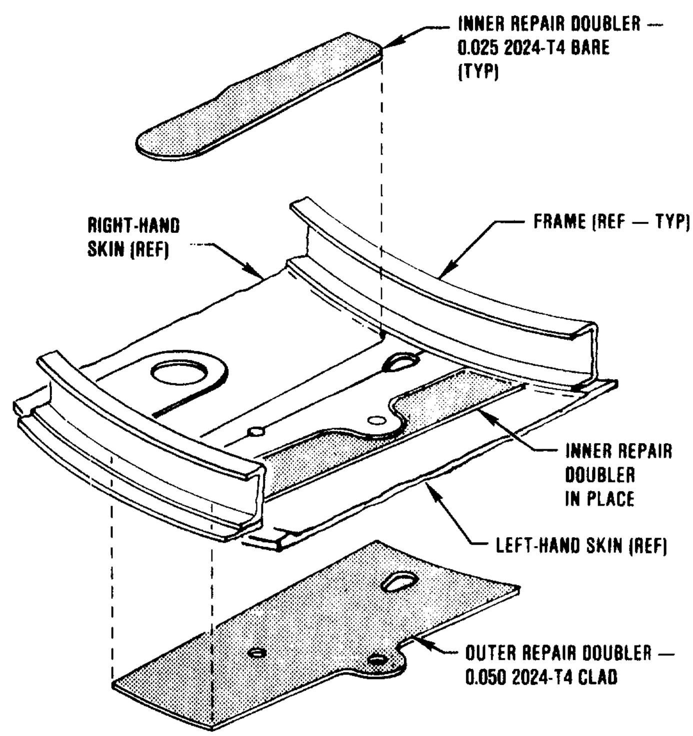
2 Lay out and drill repair fastener holes.

3 Remove fasteners to be picked up in repair.

4 Fabricate repair parts.

5 Prepare inner repair doublers and inner skin surfaces for bonding. (Refer to "Adhesive Bonding" in Chapter 51.)

6 Bond and rivet repair parts and other removed items in place. (Refer to "Structural Metal-to-Metal Bonding" in Chapter 51.)



CAUTION

ALL RIVETING MUST BE DONE WHILE ADHESIVE IS IN PLASTIC STATE. RIVETING A CURED REPAIR WILL DESTROY BOND.

NOTES

- THIS REPAIR IS APPLICABLE TO CRACKED SKINS AT FUSELAGE BOTTOM CENTERLINE BETWEEN FS 333.625 AND 346.500. IT IS ALSO RECOMMENDED THAT THIS REPAIR BE INCORPORATED WHEN ANTENNA SUPPORT CHANNEL IS REPLACED.
- IF CRACK RUNS LATERALLY ON EITHER SKIN, REPAIR MUST BE EXTENDED, ON AFFECTED SIDE, TO PROVIDE TWO ROWS OF FASTENERS OUTBD OF STOP-DRILLED CRACK.

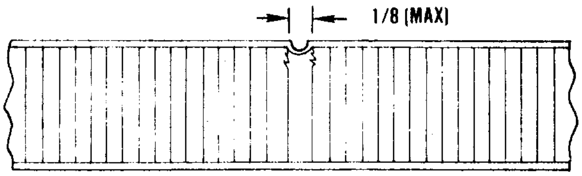
UHF Antenna Support and Adjacent Skin Repair
Figure 217 (Sheet 2 of 2)

AUXILIARY STRUCTURE

REPAIRS

GENERAL

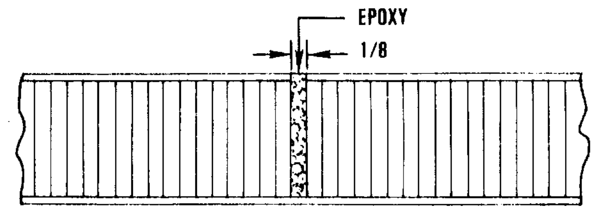
This section contains repairs for the auxiliary structure of the fuselage which includes the floor section. See figures 201 through 204. For applicability of repairs refer to section 53-10-00.



CLASS A DAMAGE — SHARP DENT OR SMALL HOLE

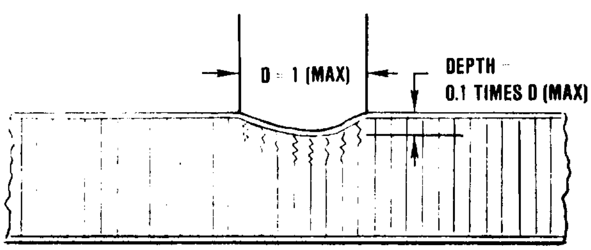
NOTES

- THESE ILLUSTRATIONS PROVIDE INSTRUCTIONS FOR REPAIR OF FUSELAGE HONEYCOMB FLOOR PANELS.
- TOTAL DAMAGED AREA MUST INCLUDE ANY DELAMINATION AROUND A DENT OR PUNCTURE. TO DETERMINE EXTENT OF DELAMINATION, IF ANY, TAP AREA WITH A COIN. TAPPING A BONDED FACE SHEET PRODUCES A METALLIC RING. TAPPING AN UNBONDED FACE SHEET PRODUCES A SOUND THAT IS DULL BY COMPARISON.



1 Drill out damage with 1/8 in. drill.

2 Fill void with epoxy.



CLASS B DAMAGE — DENTS WITH ABRUPT CHANGES IN CONTOUR, SCRATCHES, OR CRACKS — WITHIN THE LIMITS SHOWN.

1 Stop-drill ends of all cracks with No. 40 drill.

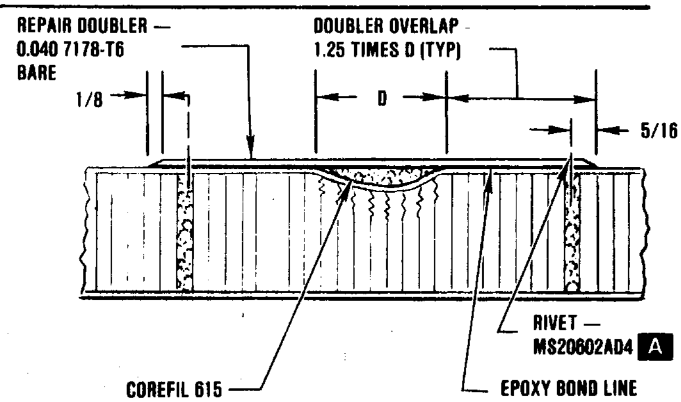
2 Smooth and blend all scratches and gauges by sanding.

3 Fabricate repair doubler.

4 Prepare damaged skin and repair doubler for bonding. (Refer to 51-70-00.)

NOTE

A ONE ROW OF RIVETS REQURIED AROUND REPAIR DOUBLER AT FROM 1-1/2 TO 2 IN. SPACING. MIN OF FOUR RIVETS REQUIRED ON ANY REPAIR; TO BE PLACED AT CORNERS OF A RECTANGULAR REPAIR DOUBLER.



5 Fill dent with Corefil 615. When Corefil is cured, sand and blend with surrounding area.

6 Position repair doubler over damage and line-drill rivet holes.

7 Inject honeycomb cells under rivet holes with epoxy, completely filling voids.

8 Bond and rivet repair doubler in place. Rivets must be installed while epoxy is soft. (Refer to 51-70-0.)

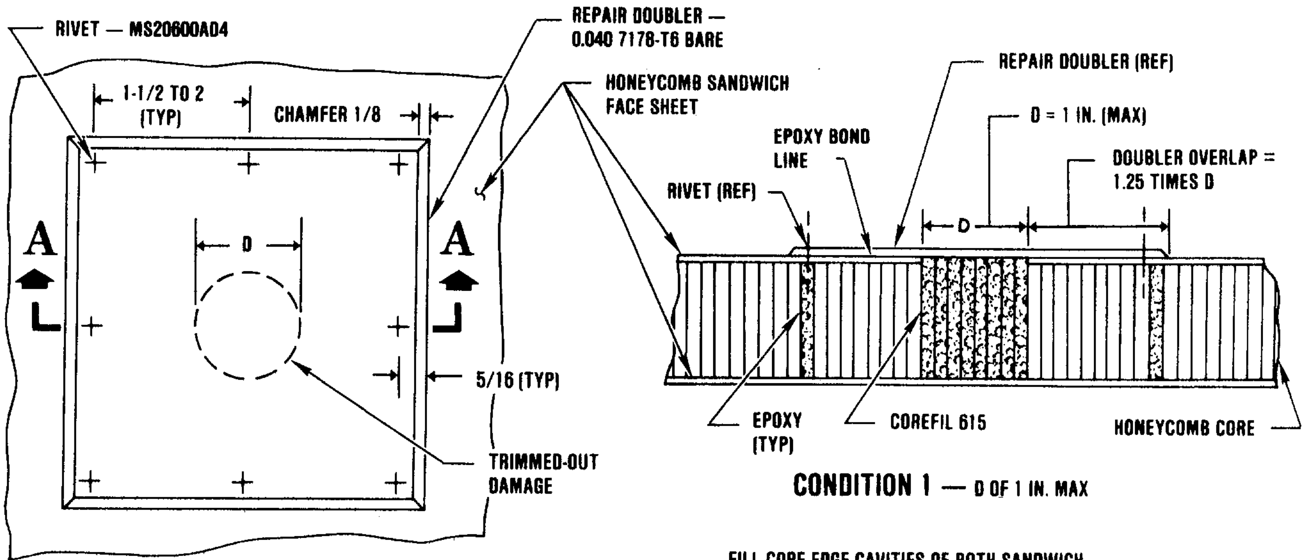
CLASS C DAMAGE — HOLES OVER 1/8 IN. DIA DENTS WITH DIA GREATER THAN 1 IN. AND/OR DEPTH GREATER THAN 0.1 TIMES DIA. HOLES OR DENTS MAY AFFECT ONE OR BOTH FACE SHEETS. WHEN BOTH FACE SHEETS ARE AFFECTED, REPAIR IS DUPLICATED ON OPPOSITE SIDE OF PANEL.

NOTE

CLASS C DAMAGE IS FURTHER DIVIDED INTO FOUR CONDITIONS FOR REPAIR PURPOSES. REPAIR SKETCHES SHOWN FOR CONDITIONS 1 THRU 3 DEAL WITH DIFFERENCES IN REPAIR REQUIREMENTS FOR DIFFERENT SIZES OF TRIMMED-OUT DAMAGE. REPAIR SKETCHES FOR CONDITION 4 DEAL WITH SPECIAL REQUIREMENTS WHEN DAMAGE IS CLOSE TO A HONEYCOMB SANDWICH PANEL EDGE MEMBER.

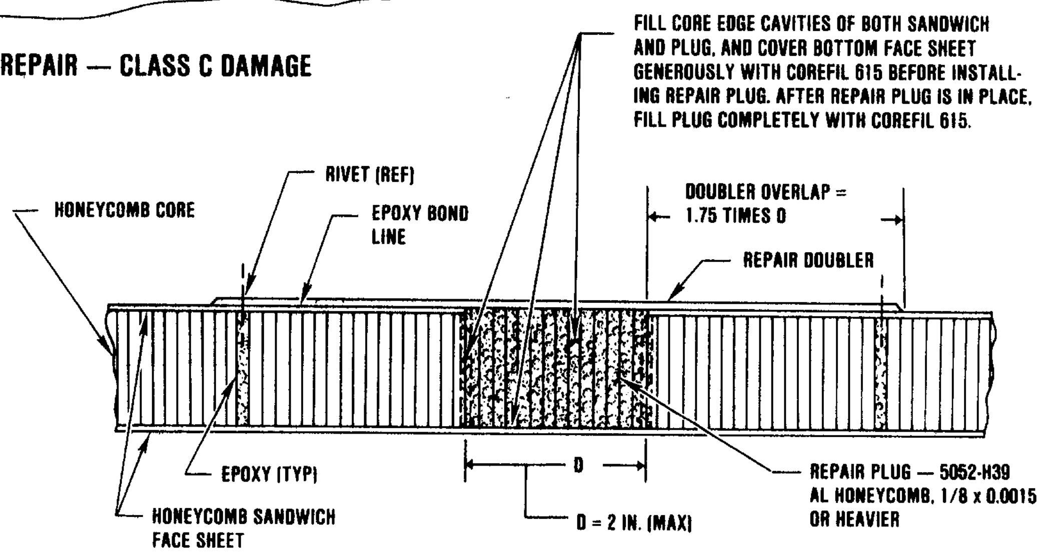
S265-3-136

Honeycomb Floor Panel Repair
Figure 201 (Sheet 1 of 3)

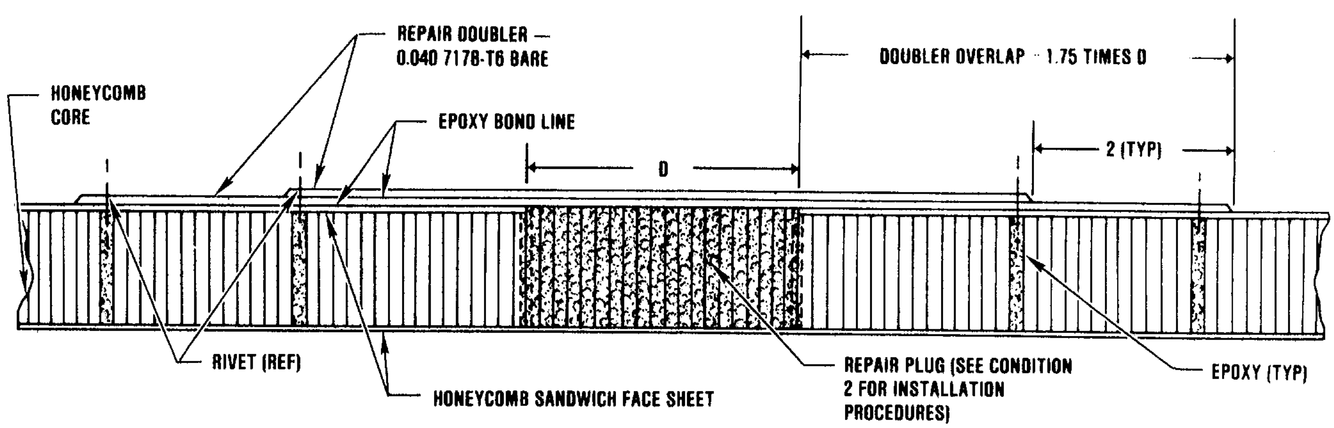


REPAIR — CLASS C DAMAGE

CONDITION 1 — D OF 1 IN. MAX



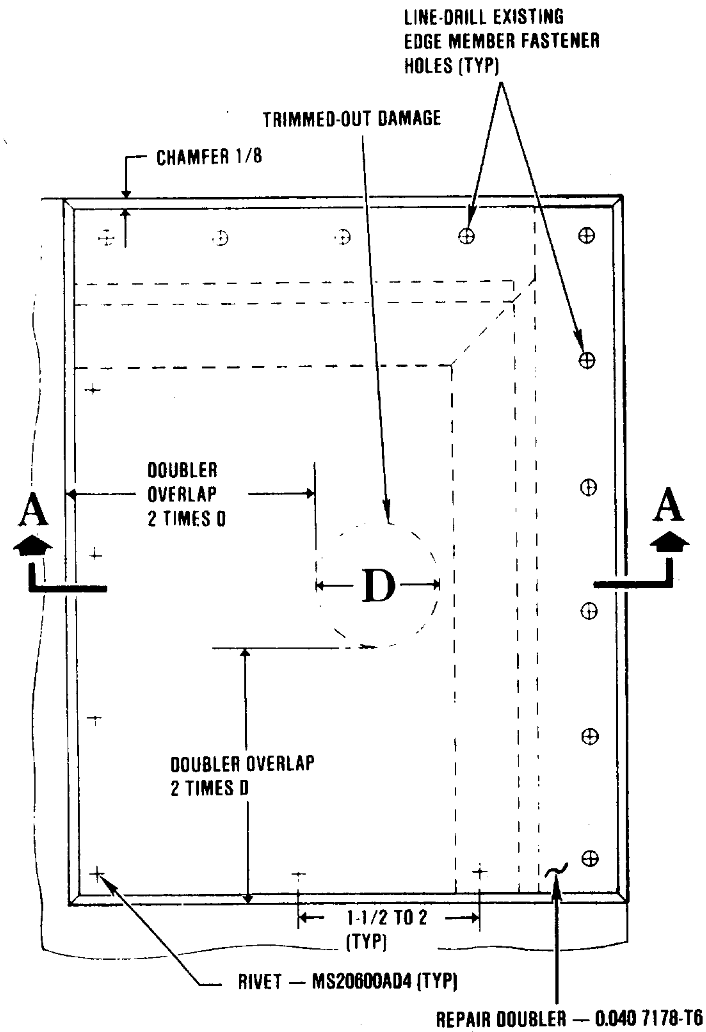
CONDITION 2 — D OF 2 IN. MAX



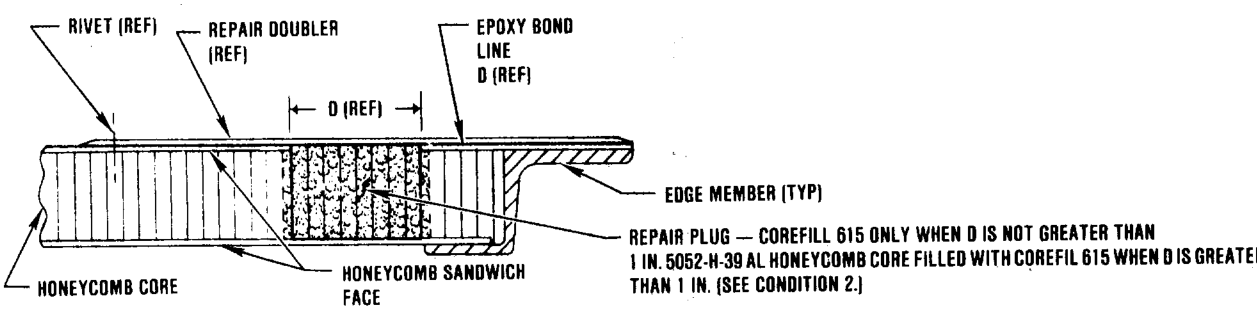
CONDITION 3 — GREATER THAN 2 IN.

S265-3-137

Honeycomb Floor Panel Repair
Figure 201 (Sheet 2 of 3)



CONDITION 4 — DAMAGE NEAR ONE OR MORE EDGE MEMBERS



SECTION **A-A**

NOTE

SEE CONDITIONS 1 THROUGH 3 FOR FILLER PLUG AND REPAIR DOUBLER REQUIREMENTS IN RESPECT TO D (TRIMMED-OUT DAMAGE DIA). THIS REPAIR DIFFERS FROM THOSE SHOWN IN CONDITIONS 1 THROUGH 3 AS FOLLOWS: (1) WHEN DAMAGE IS NEAR AN EDGE MEMBER, REPAIR DOUBLER OVERLAP IS 2 TIMES D REGARDLESS OF LENGTH OF D, AND (2) REPAIR DOUBLER EXTENDS TO EDGE OF PANEL AS SHOWN.

1 Check for delamination and outline area of damage.

2 Calculate doubler overlap and mark overlap area on damaged face sheet.

3 Strip paint from area to be bonded.

4 Fabricate repair doubler(s) except for rivet holes.

5 Clean and prepare repair doubler(s) and damaged face sheet for bonding. (Refer to 51-70-00.)

CAUTION

EXTREME CARE MUST BE TAKEN IN ALL OPERATIONS PERFORMED AFTER CLEANING TO ENSURE THAT CLEANED SURFACES DO NOT BECOME CONTAMINATED. CLEAN COTTON GLOVES MUST BE WORN AND ALL TOOLS THAT COME IN CONTACT WITH CLEANED PARTS MUST BE GREASE-FREE.

6 Trim out damaged area. When damage affects one face sheet only, remove core in affected area but do not attempt to remove original adhesive on inside of undamaged face sheet.

7 Position repair doubler(s) and drill rivet holes.

8 Fabricate honeycomb repair plug, when required.

9 Clean trimmed-out hole and honeycomb repair plug as applicable. (Refer to 51-70-00.)

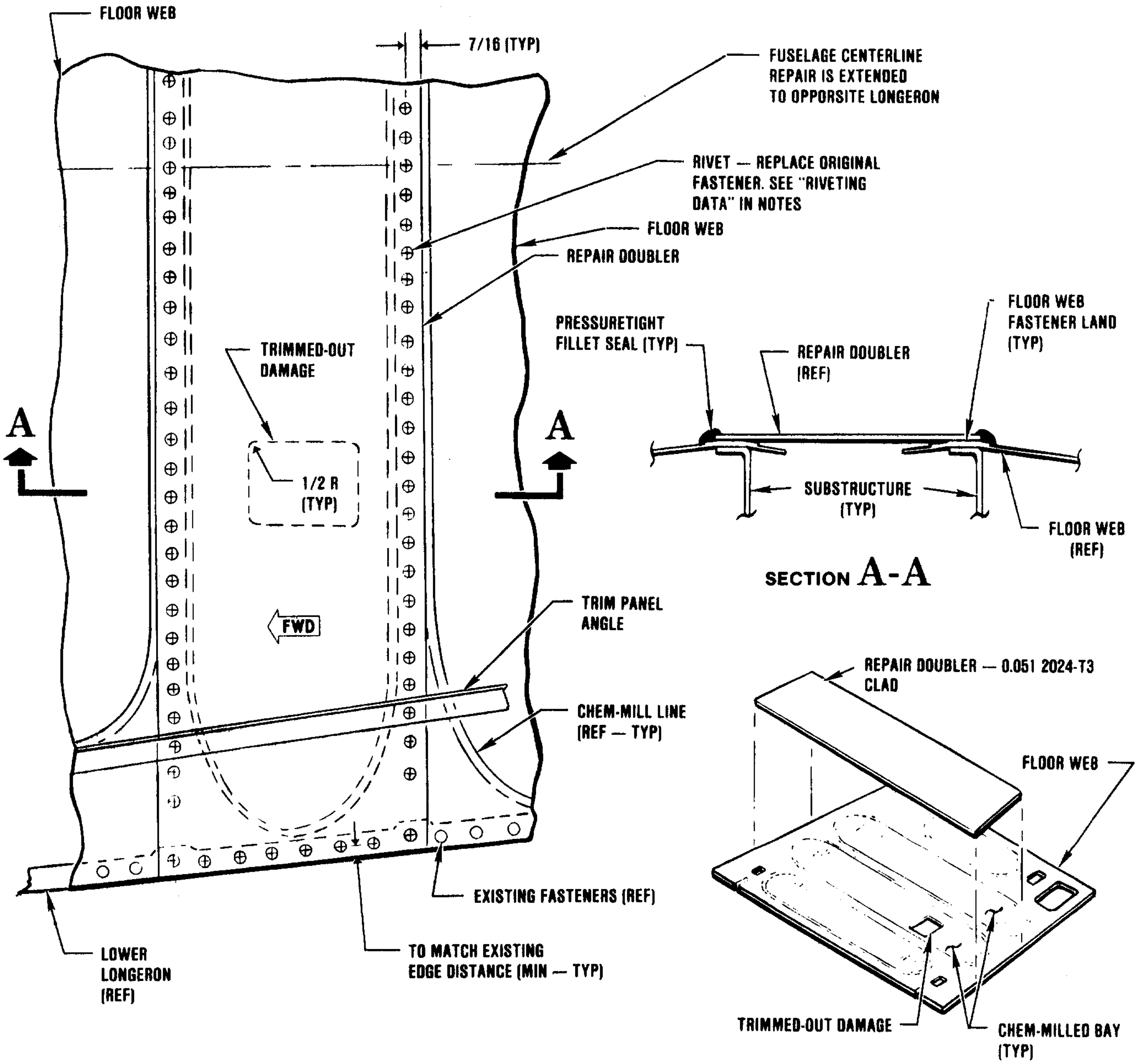
10 Install honeycomb repair plug and fill plug with Corefil 615 as shown in Condition 2 repair or fill honeycomb cavity with Corefil 615 only, as applicable. (See Condition 1 repair.)

11 When Corefil 615 is cured, sand and blend with surrounding area.

12 Perform final cleaning of all surfaces to be bonded by wiping with methyl ethyl ketone (MEK). Repair doublers may be vapor degreased if equipment is available. (Refer to 51-70-00.)

13 Fill honeycomb core under rivet holes with epoxy, and bond and rivet repair doubler in place. Rivets must be installed while epoxy is soft. (Refer to 51-70-00.)

Honeycomb Floor Panel Repair
Figure 201 (Sheet 3 of 3)



NOTES

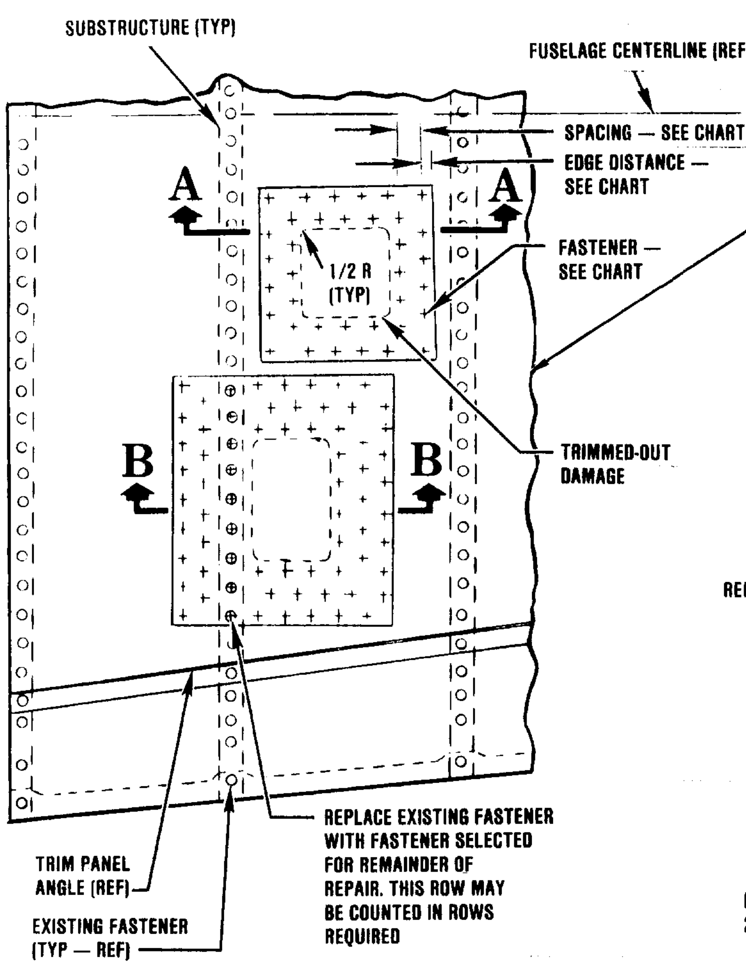
- THIS REPAIR IS APPLICABLE TO CHEM-MILLED FUSELAGE FLOOR WEB, FS 298.5 TO 333.625.
- EACH REPAIR MUST SPAN A CHEM-MILLED BAY [A] (MIN). WHEN DAMAGE HAS AFFECTED A WEB LAND, REPAIR DOUBLER MUST BE EXTENDED ACROSS ADJACENT BAY.
- RIVETING DATA:
  REPLACE ALL MS2047DAD5 RIVETS WITH EITHER MS20470DD6 OR NAS1054-6 (HS48-6) HI-SHEAR RIVETS. REPLACE ALL MS20470DD6 RIVETS WITH LIKE FASTENERS OR WITH NAS1054-6 (HS48-6) HI-SHEAR RIVETS.

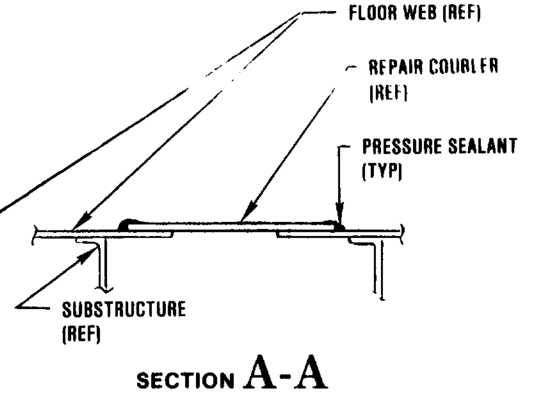
[A] A CHEM-MILLED BAY IS A THINNED PORTION OF WEB BOUNDED BY FASTENER LANDS.

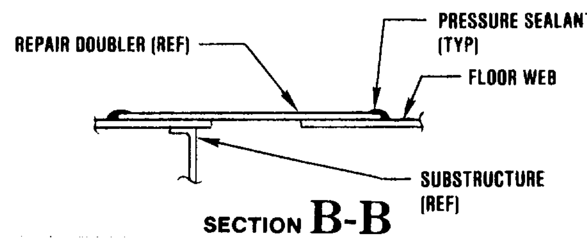
1. Trim out damaged area.
2. Remove all fasteners in and around damaged bay.
3. Remove pressure sealant as required.
4. Fabricate repair doubler.
5. Slide repair doubler under trim panel angle and rivet in place.
6. Fillet seal all edges of repair doubler. (Refer to 51-20-10, Pressuretight and Liquidtight Sealing.)

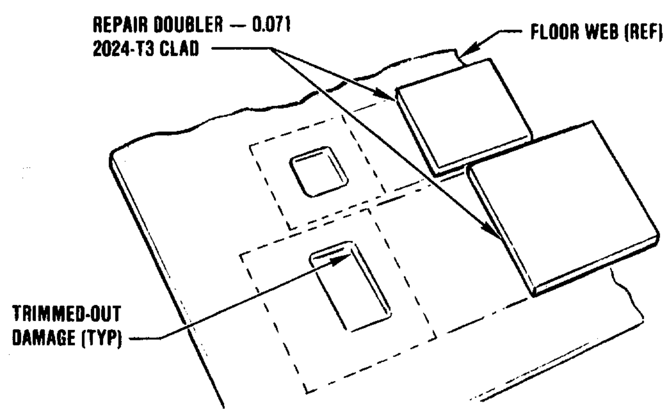
S265-3-139

Floor Web Repairs — Fuselage Stations (FS) 298.5-333.625
Figure 202 (Sheet 1 of 2)









FASTENER	ROWS REQD	SPACING		EDGE DISTANCE
		MIN	MAX	
MS20470AD5	3	7/8	1-1/8	5/16
MS20470DD6	2	1	1-5/16	3/8
A MS20600AD5	3	7/8	1-1/8	5/16
A MS20600AD6	2	1	1	3/8
NAS1054-6 (HS48-6)	2	1	1-1/2	3/8
NAS1398B5	3	7/8	1-1/8	5/16
NAS1398B6	2	1	1	3/8
P164	2	1	1-1/4	3/8
A OR MS20602				

NOTES

- THESE REPAIRS ARE APPLICABLE TO CONSTANT THICKNESS FLOOR WEBS, FS 298.5 TO 333. 625
- TWO REPAIR EXAMPLES ARE SHOWN. BOTH REPAIRS MAY BE MADE, USING EITHER TWO OR THREE ROWS OF FASTENERS, DEPENDING UPON FASTENER SELECTED FROM CHART.

1 Trim out damaged area.

2 Remove pressure sealant as required.

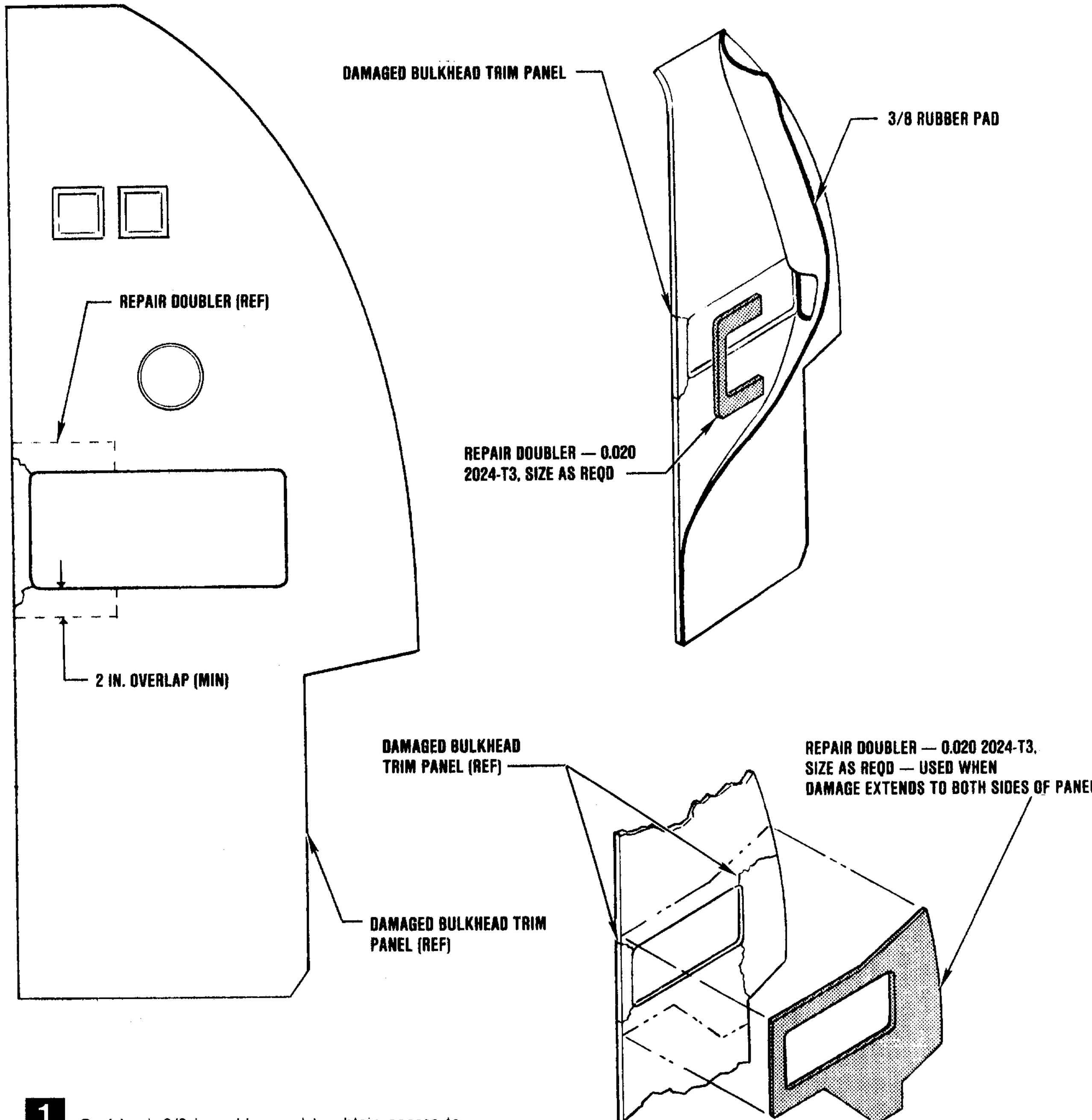
3 Fabricate repair doubler.

4 Install repair doubler, using repair fastener from chart.

5 Pressure-seal all edges of repair doubler. (Refer to 51-20-10.)

S265-3-140

Floor Web Repairs — Fuselage Stations (FS) 298.5 to 333.265
Figure 202 (Sheet 2 of 2)



1 Peel back 3/8 in. rubber pad to obtain access to damaged area.

2 Make repair doubler from 2024-T3 clad aluminum alloy sheet. Repair doubler must extend a minimum of 2 in. on each side of damage.

3 Scuff-sand faying surfaces to be bonded.

4 Prepare adhesive. (Refer to 51-20-20. Use metal-to-metal bonding procedure.)

5 Apply adhesive to both faying surfaces.

6 Clamp repair doubler in place and allow to cure for 4 hours.

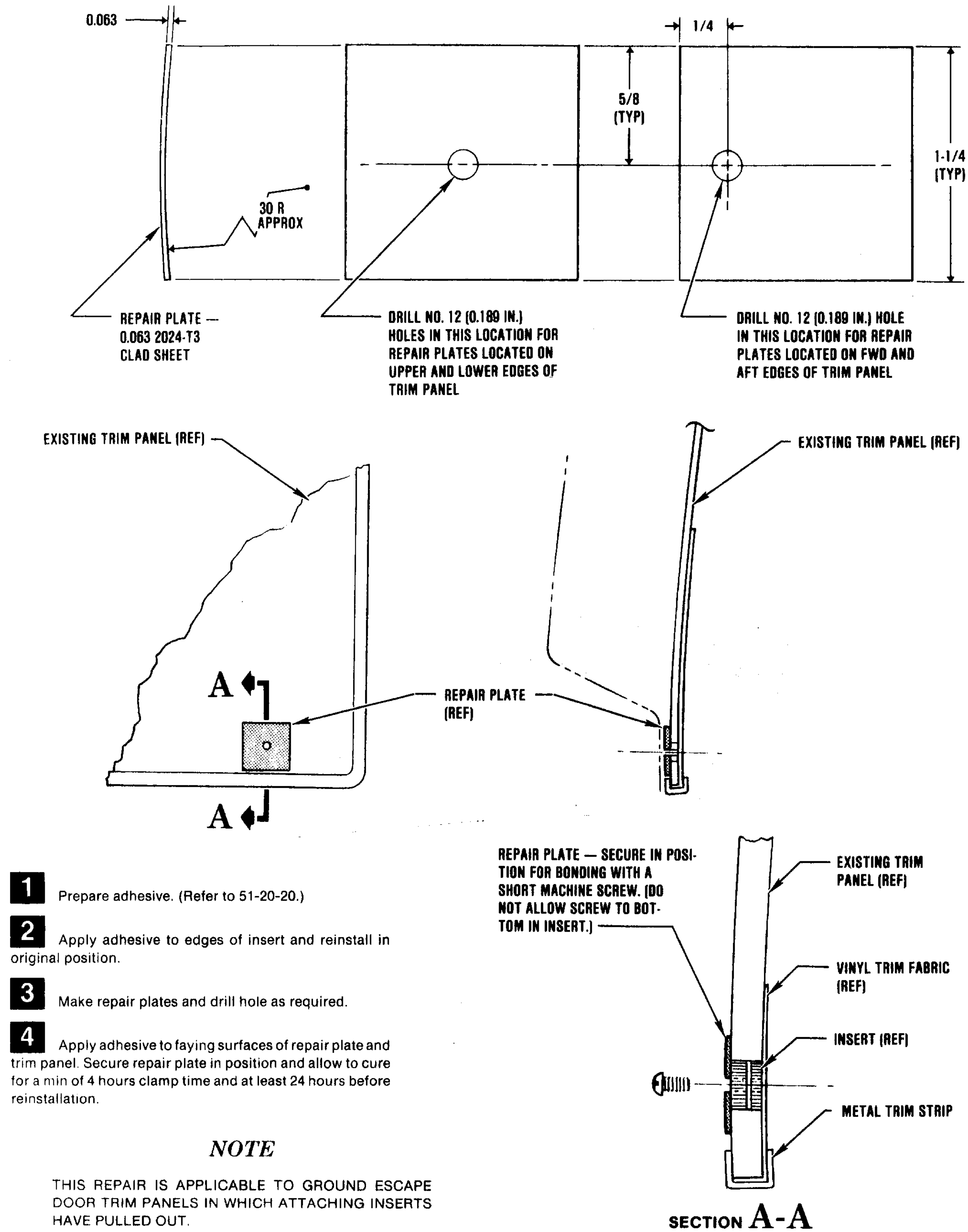
7 After clamps have been removed and repair has thoroughly cured, cement rubber pad back in place.

NOTE

THIS TYPE OF REPAIR IS APPLICABLE TO ALL MICARTA-FACED TRIM PANELS.

S265-3-141

Micarta-faced Cabin Trim Panel Repair
Figure 203



1 Prepare adhesive. (Refer to 51-20-20.)

2 Apply adhesive to edges of insert and reinstall in original position.

3 Make repair plates and drill hole as required.

4 Apply adhesive to faying surfaces of repair plate and trim panel. Secure repair plate in position and allow to cure for a min of 4 hours clamp time and at least 24 hours before reinstallation.

NOTE

THIS REPAIR IS APPLICABLE TO GROUND ESCAPE DOOR TRIM PANELS IN WHICH ATTACHING INSERTS HAVE PULLED OUT.

Ground Escape Door Trim Panel Repair
Figure 204

PLATES AND SKINS

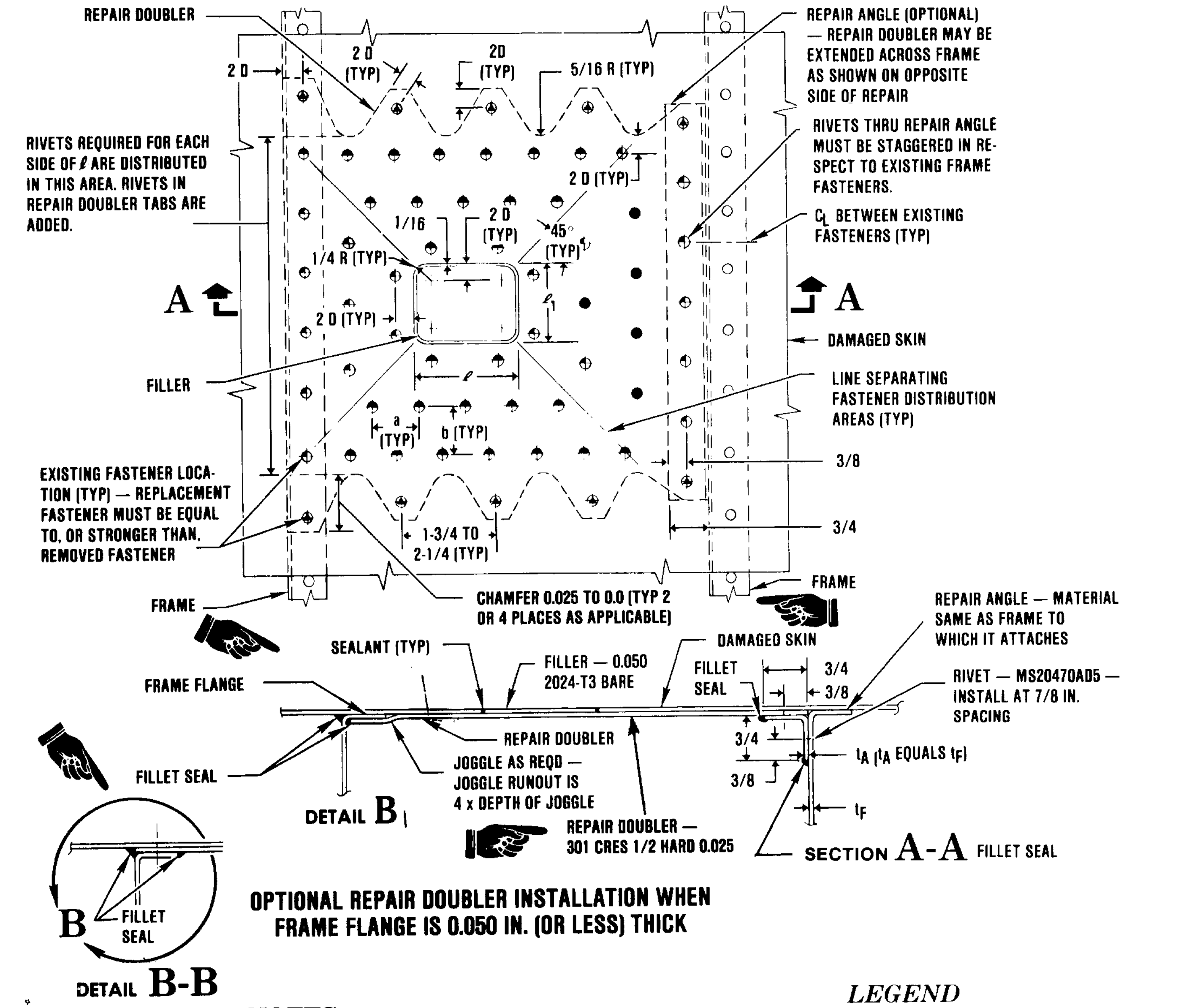
REPAIRS

GENERAL

This section contains repairs for the exterior surfaces of the fuselage, including access covers. Refer to section 53-10-00 for applicability of repairs. See Figures 201 thru 209.

NOTES

- ***Prime all repair parts and mating surfaces with Epoxy Polyamide Primer. Install parts using PR1432G faying surface sealant between mating surfaces, except mating surfaces to be bonded.***
- ***For all structural bonding, refer to chapter 51-20-20, pages 201 thru 205.***



NOTES

- ***Repairs in this figure are applicable to constant-thickness skins on pressurized areas of fuselage.***
- ***Repair shown on Sheet 1 is applicable when trimmed-out damage location permits installation of required fasteners within damaged bay. Use repair on Sheet 2 when damage is across a frame or when fasteners required cannot be installed in one bay.***
- ***See Sheet 3 for crack repairs and inside view of repairs.***
- ***See Sheet 4 for fastener requirements.***
- ***Rivet spacing "a" and row spacing "b" equal nearest existing rivet spacing (min) but not less than 5-1/2 times repair rivet dia max spacing for both "a" and "b" is 1-1/2 in.***
- ***Countersink skin for all rivets.***

LEGEND

D Rivet dia

t Material thickness

(symbol) Rivets reqd each side of ℓ

(symbol) Rivets reqd each side of ℓ_1

● Field rivets added to complete rivet pattern

(symbol) Rivets in repair doubler tabs (size and type to match other rivets in repair doubler)

+ Rivets in filler (MS20426AD4)

EXAMPLE — REPAIR IN ONE BAY

ℓ = 2 in. ℓ_1 = 1-1/2 in.

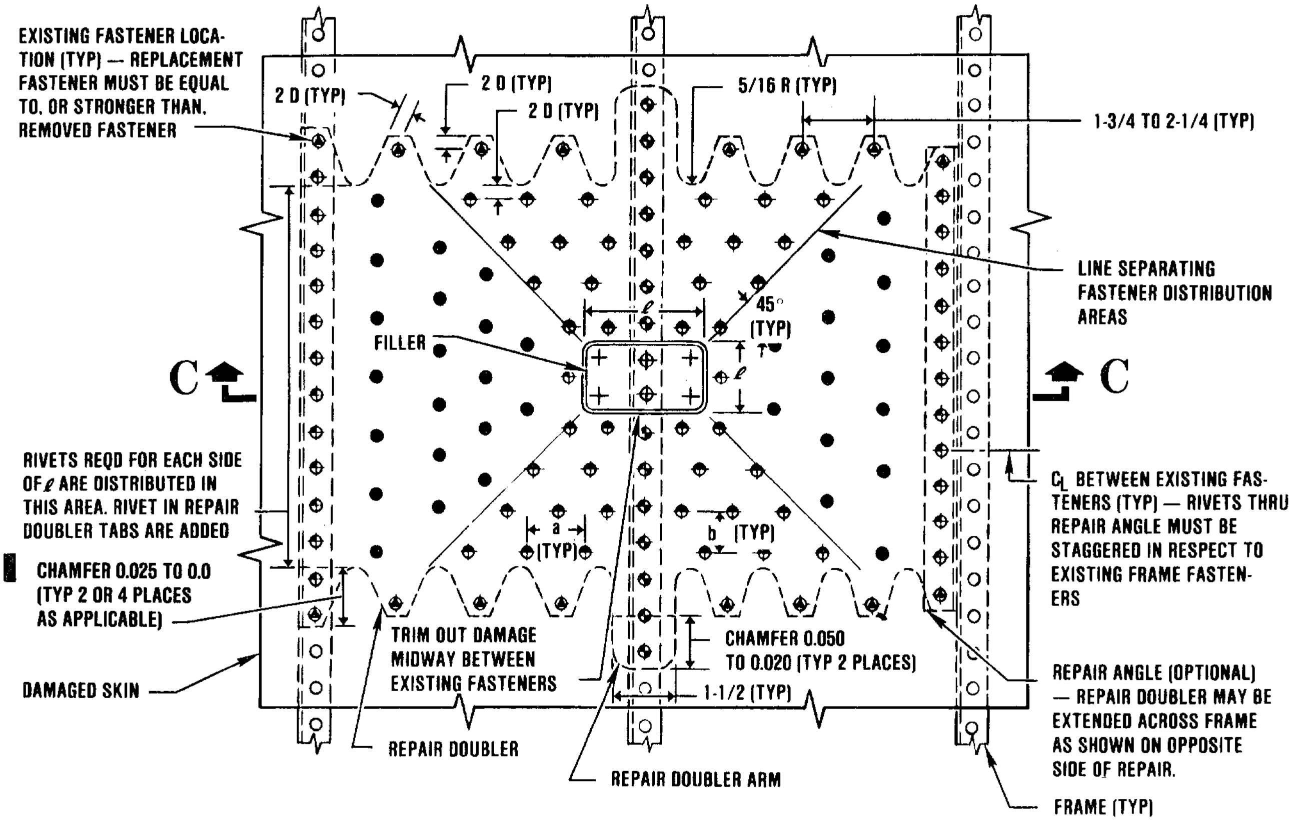
Rivet = MS20426AD5

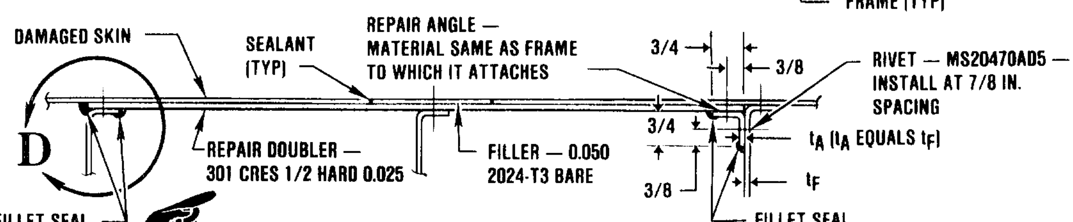
From the rivet chart (sheet 4):

13.4 or 14 rivets are required each side of ℓ

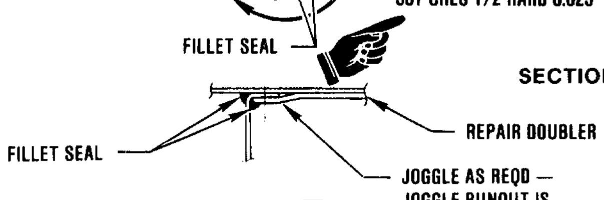
10 rivets are required each side of ℓ_1

Constant-thickness Skin Repairs — Pressurized Areas
Figure 201 (Sheet 1 of 4)





SECTION C-C



DETAIL D

OPTIONAL REPAIR DOUBLER INSTALLATION WHEN FRAME FLANGE IS 0.050 IN. (OR LESS) THICK

EXAMPLE — REPAIR ACROSS A FRAME

ℓ = 3 in. ℓ_1 = 1-3/4 in.

Rivets in skin land splice are MS2D426AD5.

Rivets from chart (sheet 4) are MS20426AD5.

From rivet chart (sheet 4):

20 rivets are required each side of ℓ.
11.7 or 12 rivets are required each side of ℓ_1.

NOTE

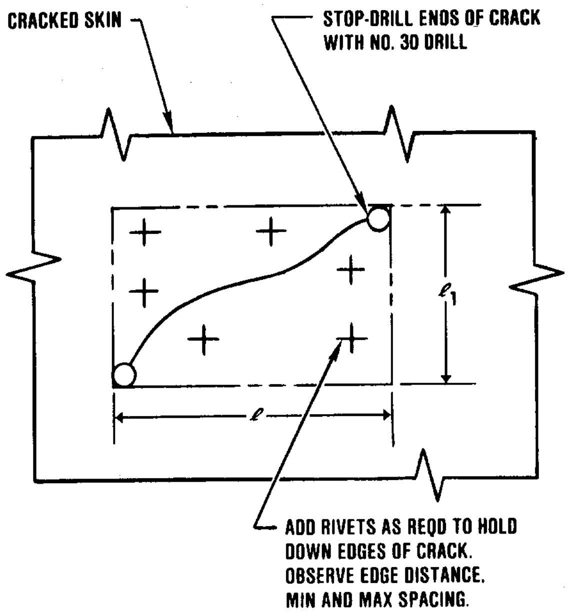
COUNTERSINK SKIN FOR ALL RIVETS.

LEGEND

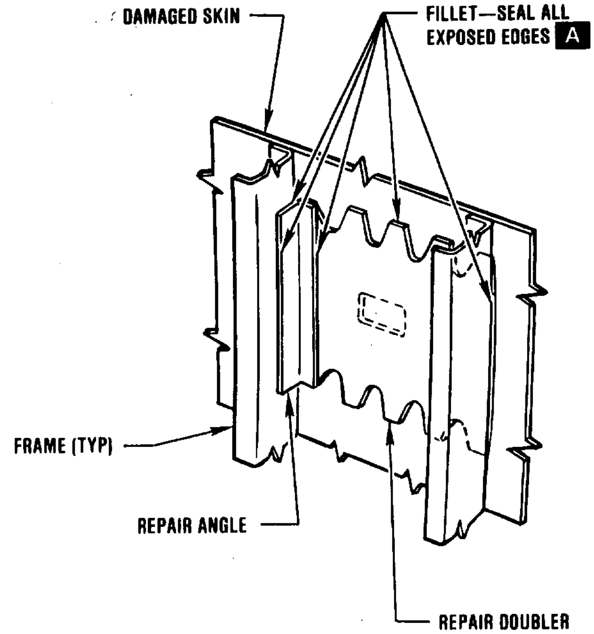
- D Rivet dia
- t Material thickness
- Rivets reqd each side of ℓ
- Rivets reqd each side of ℓ_1
- Field rivets added to complete rivet pattern
- Rivets in repair doubler tabs (size and type to match other rivets in repair doubler)
- Rivets in repair doubler and repair doubler arm [7 reqd each side of damage in existing locations — replacement fasteners to match removed fasteners but must be MS20426AD5 (min)]
- Existing fastener location (to match original)
- + Added rivets in filler (MS20426AD4)

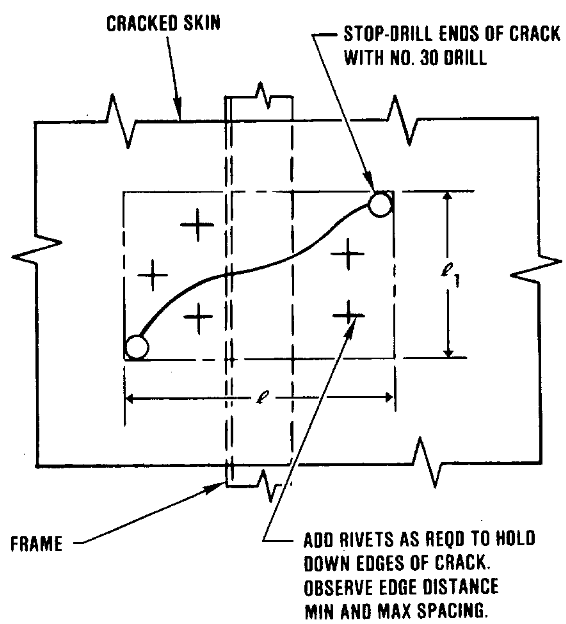
S265-3-144

Constant-thickness Skin Repairs — Pressurized Areas
Figure 201 (Sheet 2 of 4)



CRACK REPAIR — DAMAGE IN ONE BAY



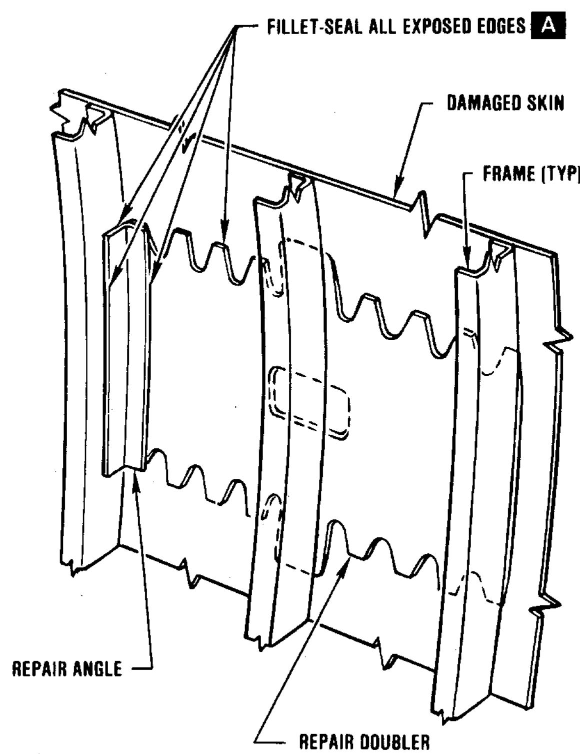


CRACK REPAIR — DAMAGE IN ONE BAY

NOTES

- CRACKED DAMAGE TO SKIN IS EXACTLY SAME AS OTHER DAMAGE EXCEPT THAT MATERIAL IN DAMAGED AREA NEED NOT BE TRIMMED OUT. OUTLINE DAMAGED AREA IN A RECTANGULAR PATTERN, PROVIDING AN ℓ AND A ℓ_1 DIMENSION AS SHOWN. PERFORM REPAIRS AS DIRECTED ON SHEETS 1 OR 2 AS APPLICABLE, EXCEPT AS NOTED IN ACCOMPANYING SKETCHES.

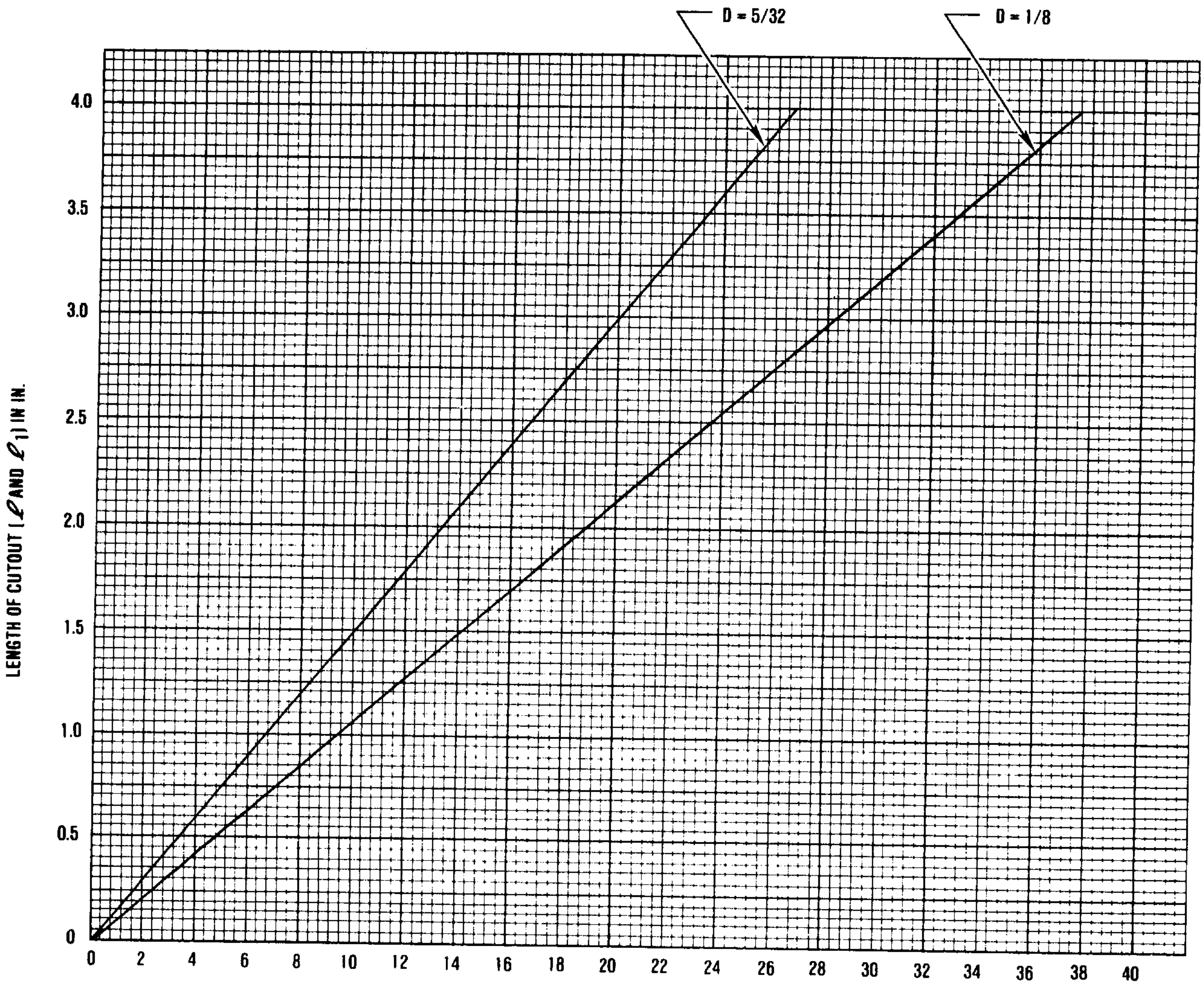
A REFER TO 51-20-20.



S265-3-145

Constant-thickness Skin Repairs — Pressurized Areas
Figure 201 (Sheet 3 of 4)

RIVET CHART



NOTES

- FASTENERS USED IN REPAIRS ARE MS20426AD4 OR MS20426AD5.
- WHEN DECIMAL IS 0.15 (OR GREATER), READ NEXT HIGHER FULL NUMBER. FOR EXAMPLE, 28.3 1/8 IN. DIA RIVETS ARE INDICATED FOR AN ℓ OF 3 IN.; THEREFORE, 29 RIVETS ARE REQUIRED. (HORIZONTALLY, EACH SMALL SQUARE EQUALS 0.4.)

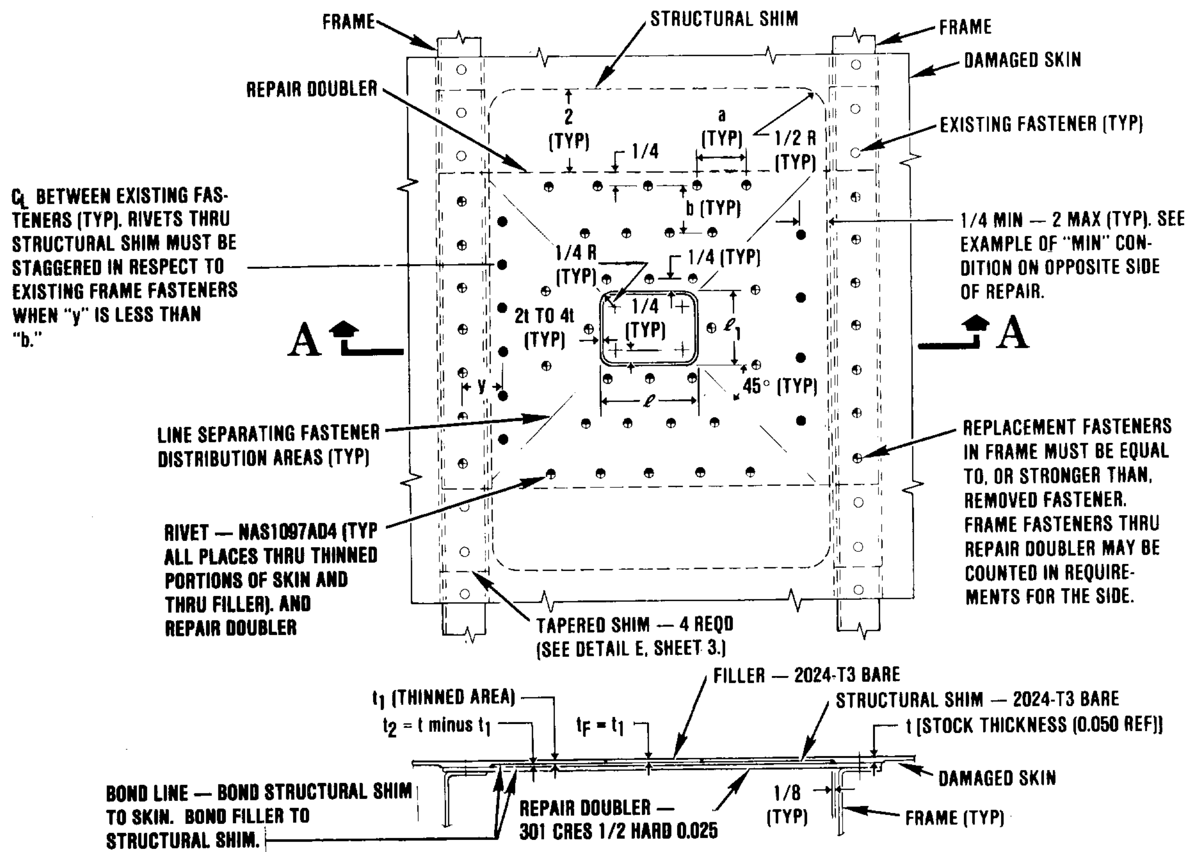
HOW TO USE THIS CHART

1 Measure trimmed-out damage (ℓ and ℓ_1).

2 Find ℓ dimension in vertical column (left side of chart). Read across chart to point of intersection of applicable diagonal line; read number of rivets required directly below point of intersection.

3 Repeat step 2 for ℓ_1 dimension.

Constant-thickness Skin Repairs — Pressurized Areas
Figure 201 (Sheet 4 of 4)



SECTION A-A

LEGEND

D Rivet dia

⊕ Rivets reqd each side of ℓ

⊕ Rivets reqd each side of ℓ_1

● Rivets added to complete rivet pattern

+ Rivets thru filler NAS1097AD4

EXAMPLE — REPAIR IN ONE BAY

ℓ = 2 in. t_1 = 0.025 in. ℓ_1 = 1-9/16 in.

From fastener chart (sheet 4):

12 rivets are required each side of ℓ
9.2 or 10 rivets are required each side of ℓ_1

The following steps apply to repairs on sheet 1 and 2.

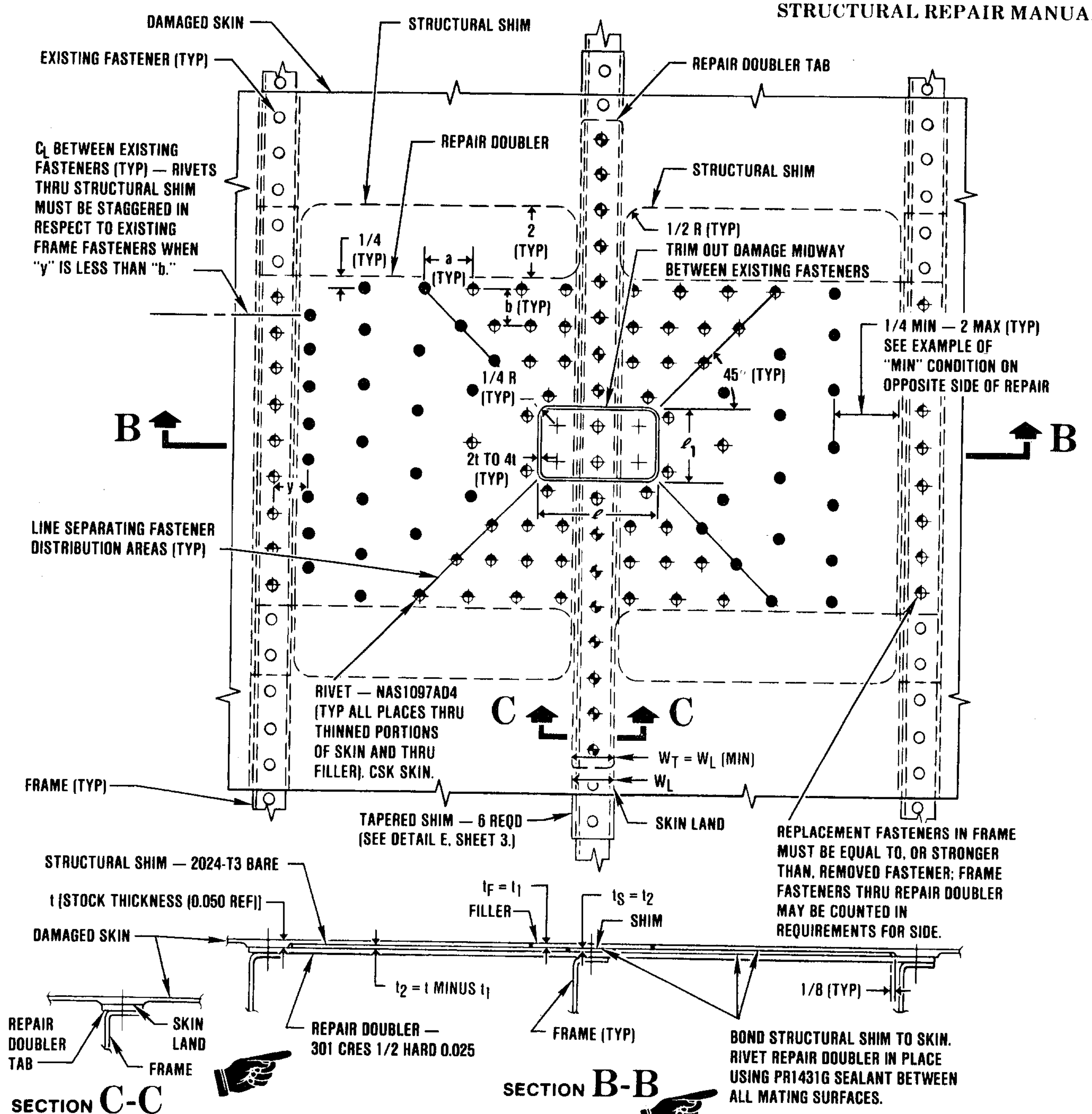
1. Trim out damage.
2. Calculate fastener requirements, repair doubler, and structural shim sizes.
3. Remove skin-to-substructure fasteners as necessary for installation of repair.
4. Fabricate and fit repair parts.
5. Drill and countersink all fastener holes.
6. Disassemble repair assembly and prepare parts and fuselage skin for bonding. (Refer to 51-20-20.)
7. Bond structural shim and filler in place.
8. Rivet repair doubler in place using PR1431G sealant between all mating surfaces.

NOTES

- ***Repairs in this figure are applicable to chem-milled skins on pressurized areas of fuselage.***
- ***Repair shown on Sheet 1 is applicable when trimmed-out damage location permits installation of required fasteners within damaged bay. Use repair on Sheet 2 when damage is across a frame or when fasteners required cannot be installed in one bay.***
- ***See Sheet 3 for crack repairs and inside views of repairs.***
- ***See Sheets 4 and 5 for fastener requirements.***
- ***Rivet spacing "a" and row spacing "b" equal 5-1/2 times fastener dia (min), but must not be less than spacing in nearest frame. Max spacing for both "a" and "b" is 1-1/2 in.***

S265-3-147

Chem-milled Skin Repairs — Pressurized Areas
Figure 202 (Sheet 1 of 5)



LEGEND

D Rivet dia

Rivets reqd each side of ℓ

Rivets reqd each side of ℓ_1

Field rivets added to complete rivet pattern

Rivets reqd for skin land splice

Existing fastener location (to match original)

\+ Fasteners added in filler (NAS1097AD4)

EXAMPLE — REPAIR ACROSS A FRAME

ℓ = 3 in. ℓ_1 = 1-3/4 in. t_1 = 0.030 in. W_L = 1 in.
Rivets in skin land splice are MS20426AD5.

From fastener chart (sheet 4):

20.4 or 21 rivets are required each side of ℓ
12 rivets are required each side of ℓ_1

From fastener chart (sheet 5):

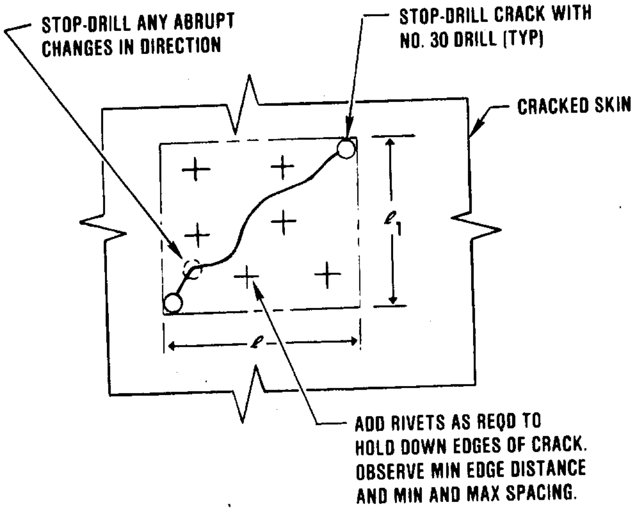
7.3 or 8 MS20426AD5 rivets are required in skin land splice each side of damage.

NOTE

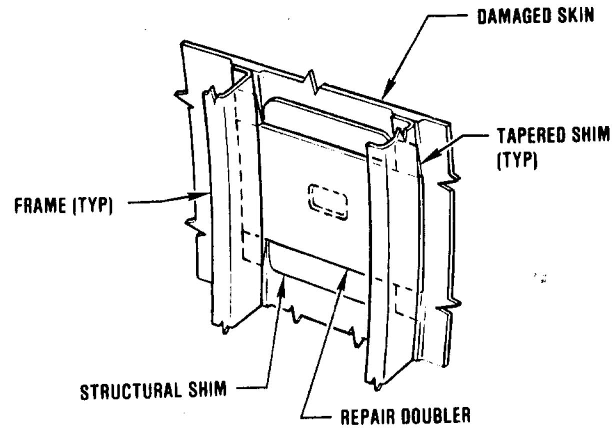
See sheet 1 for notes and steps.

S265-3-148

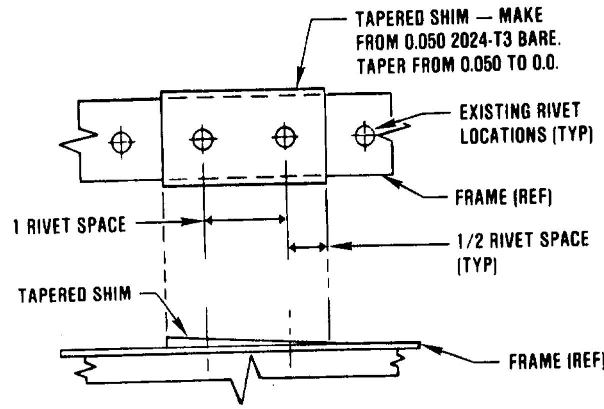
Chem-milled Skin Repairs — Pressurized Areas
Figure 202 (Sheet 2 of 5)



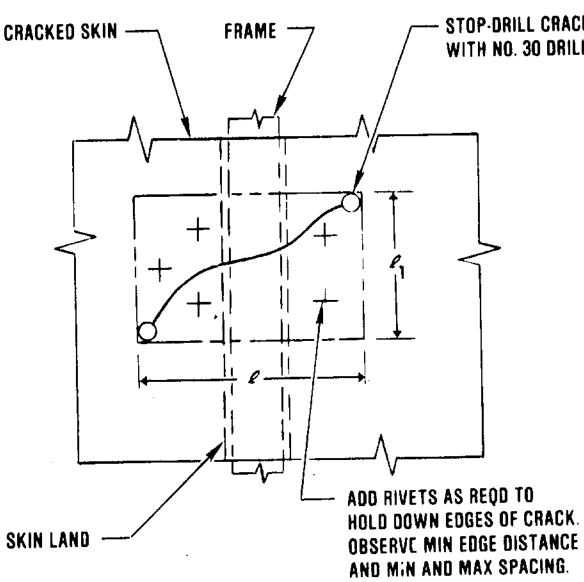
CRACK REPAIR — DAMAGE IN ONE BAY



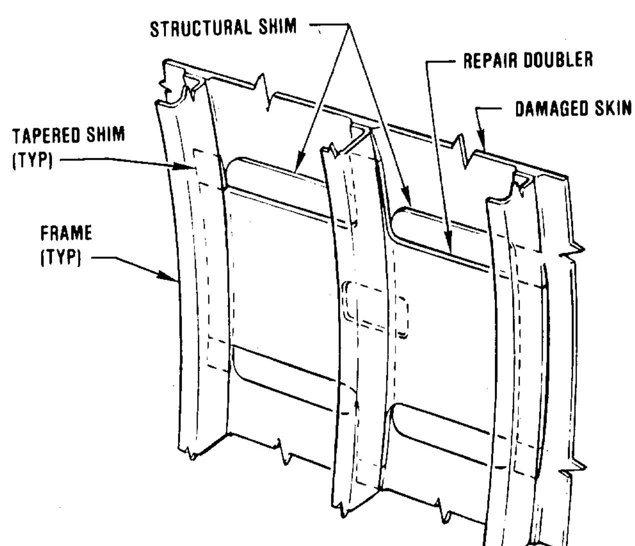
INSIDE VIEW — REPAIR OF DAMAGE IN ONE BAY BONDED IN PLACE



DETAIL **E** TAPERED SHIM



CRACK REPAIR — DAMAGE ACROSS A FRAME



INSIDE VIEW — REPAIR ACROSS A FRAME BONDED IN PLACE

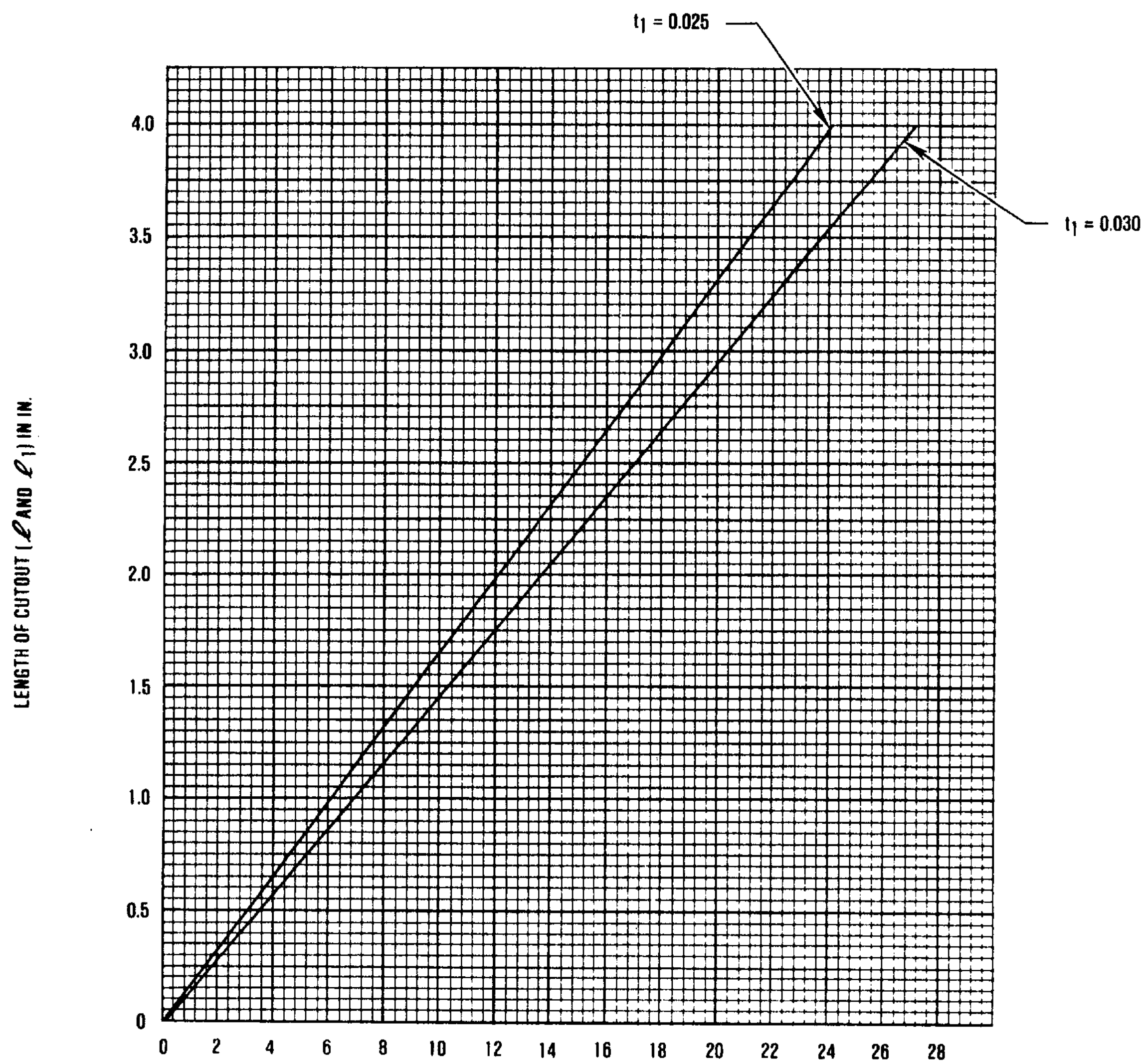
NOTE

CRACK DAMAGE TO SKIN IS REPAIRED EXACTLY SAME AS OTHER TYPES OF DAMAGE EXCEPT THAT MATERIAL IN DAMAGED AREA NEED NOT BE TRIMMED OUT. OUTLINE DAMAGED AREA IN A RECTANGULAR PATTERN, PROVIDING AN ℓ AND AN ℓ_1 DIMENSION AS SHOWN. PERFORM REPAIR AS DIRECTED ON SHEETS 1 OR 2 AS APPLICABLE, EXCEPT AS NOTED IN ACCOMPANYING SKETCHES.

S265-3-149

Chem-milled Skin Repairs — Pressurized Areas
Figure 202 (Sheet 3 of 5)

RIVET CHART FOR CHEM-MILLED AREAS OF REPAIR



NOTES

- FASTENERS USED IN CHEM-MILLED (THINNED) AREAS OF SKIN ARE NAS1097AD4 SHEAR HEAD RIVETS.
- CHEM-MILLED AREAS (t_1) MAY BE EITHER 0.025 OR 0.030 IN. THICK.
- WHEN DECIMAL IS 0.15 (OR GREATER), READ NEXT HIGHER FULL NUMBER. FOR EXAMPLE, 9.2 RIVETS ARE INDICATED FOR AN ℓ OF 1-9/16 IN. (t_1 = 0.025); THEREFORE, 10 RIVETS ARE REQUIRED. (HORIZONTALLY, EACH SMALL SQUARE EQUALS 0.4.)

HOW TO USE THIS CHART

1 Measure trimmed-out damage (ℓ and ℓ$_1$).

2 Measure thickness of damaged chem-milled skin (t_1).

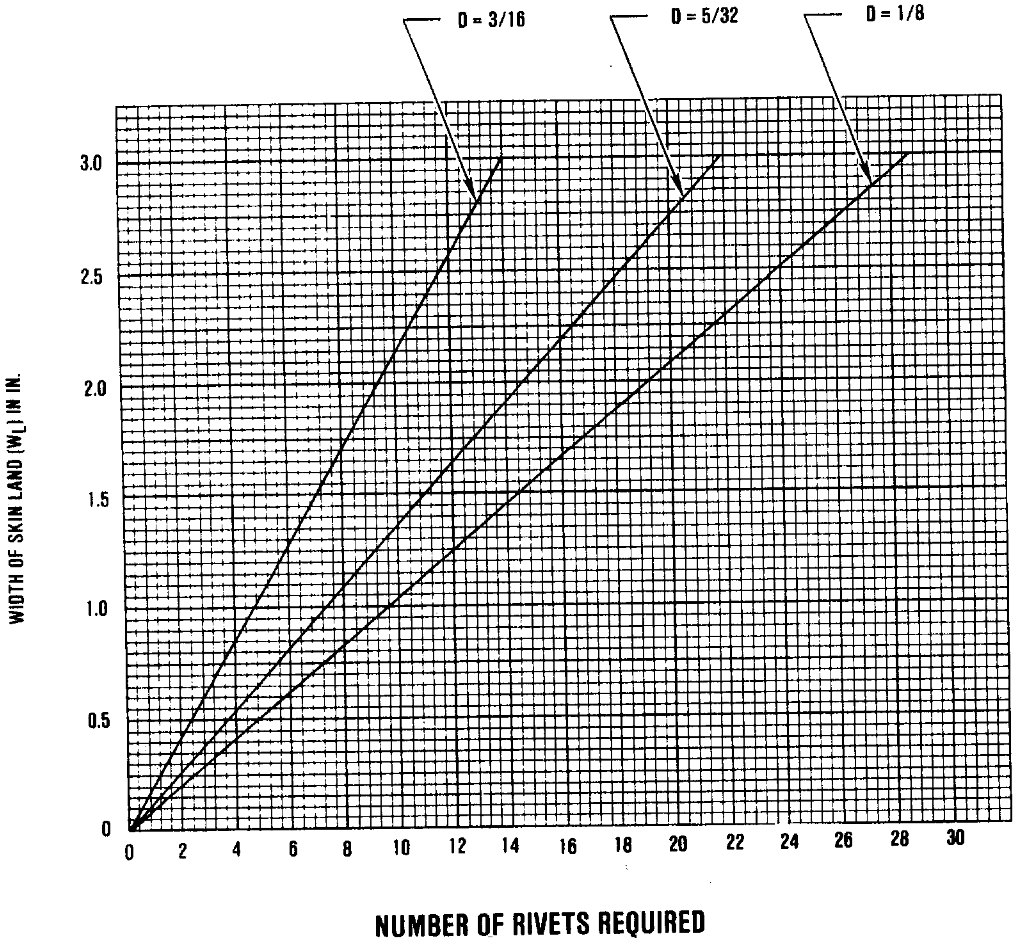
3 Find ℓ dimension in vertical column (left side of chart). Read across chart to point of intersection of applicable diagonal line; read number of rivets required directly below point of intersection.

4 Repeat steps 3 for ℓ$_1$ dimension.

S265-3-150

Chem-milled Skin Repairs — Pressurized Areas
Figure 202 (Sheet 4 of 5)

RIVET CHART FOR SKIN LAND SPLICE



NOTES

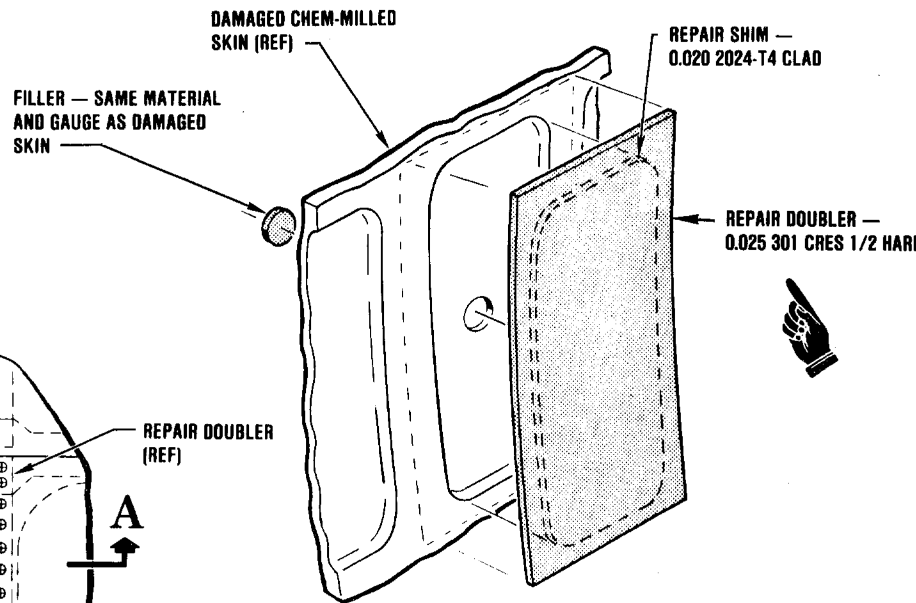
- FASTENERS USED IN SKIN-LAND-TO-SUBSTRUCTURE JOINTS ARE MS20426AD4, MS20426AD5, AND NAS 1097DD6. REPLACEMENT RIVETS MUST BE EQUAL TO, OR STRONGER THAN, ORIGINAL FASTENER.
- WHEN DECIMAL IS 0.15 (OR GREATER), READ NEXT HIGHER FULL NUMBER. FOR EXAMPLE, 9.2 NAS1097DD6 RIVETS ARE INDICATED FOR A W_L OF 2 IN.; THEREFORE, 10 RIVETS ARE REQUIRED. (HORIZONTALLY, EACH SMALL SQUARE EQUALS 0.4.)

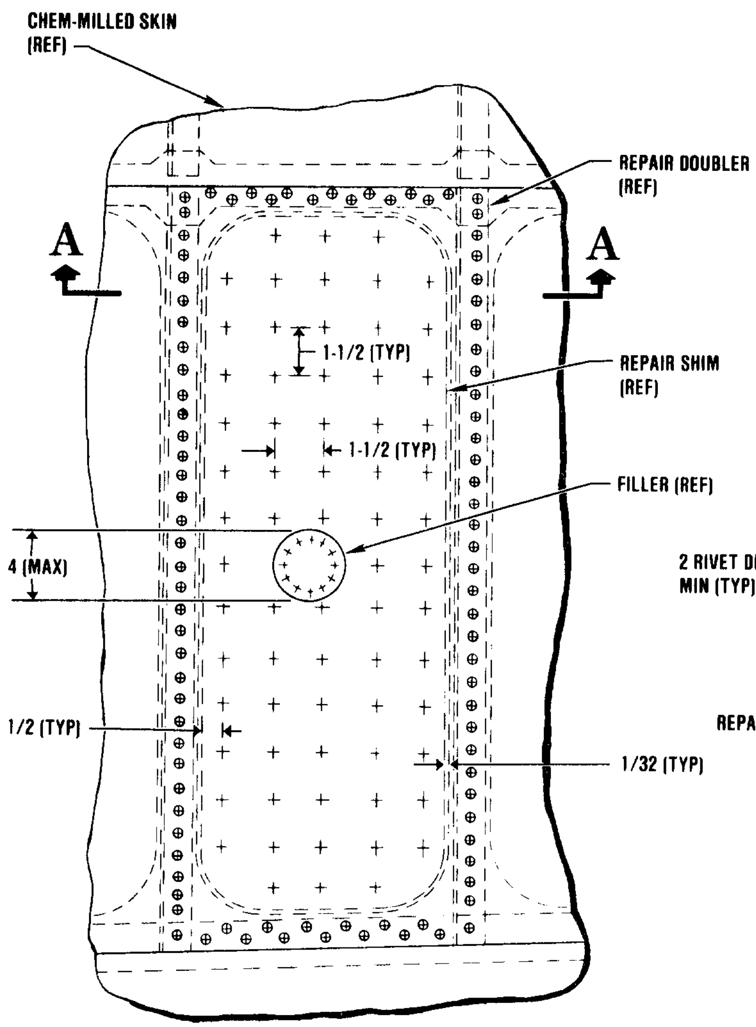
HOW TO USE THIS CHART

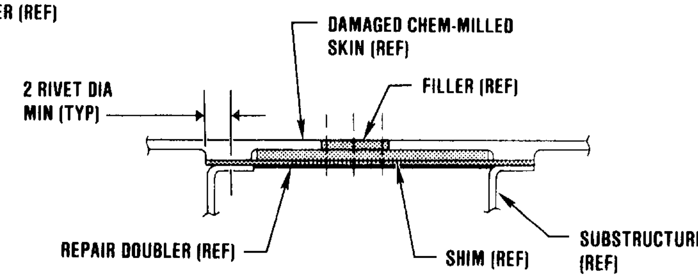
1 Measure width of skin land (W_L) to be spliced.

2 Find W_L dimension in vertical column (left side of chart). Read across chart to point of intersection of diagonal line; read number of rivets required directly below point of intersection.

Chem-milled Skin Repairs — Pressurized Areas
Figure 202 (Sheet 5 of 5)







SECTION A-A

NOTE

Prepare adhesive bond and rivet repair assembly in place. Accomplish riveting while adhesive is soft (refer to 51-20-20)

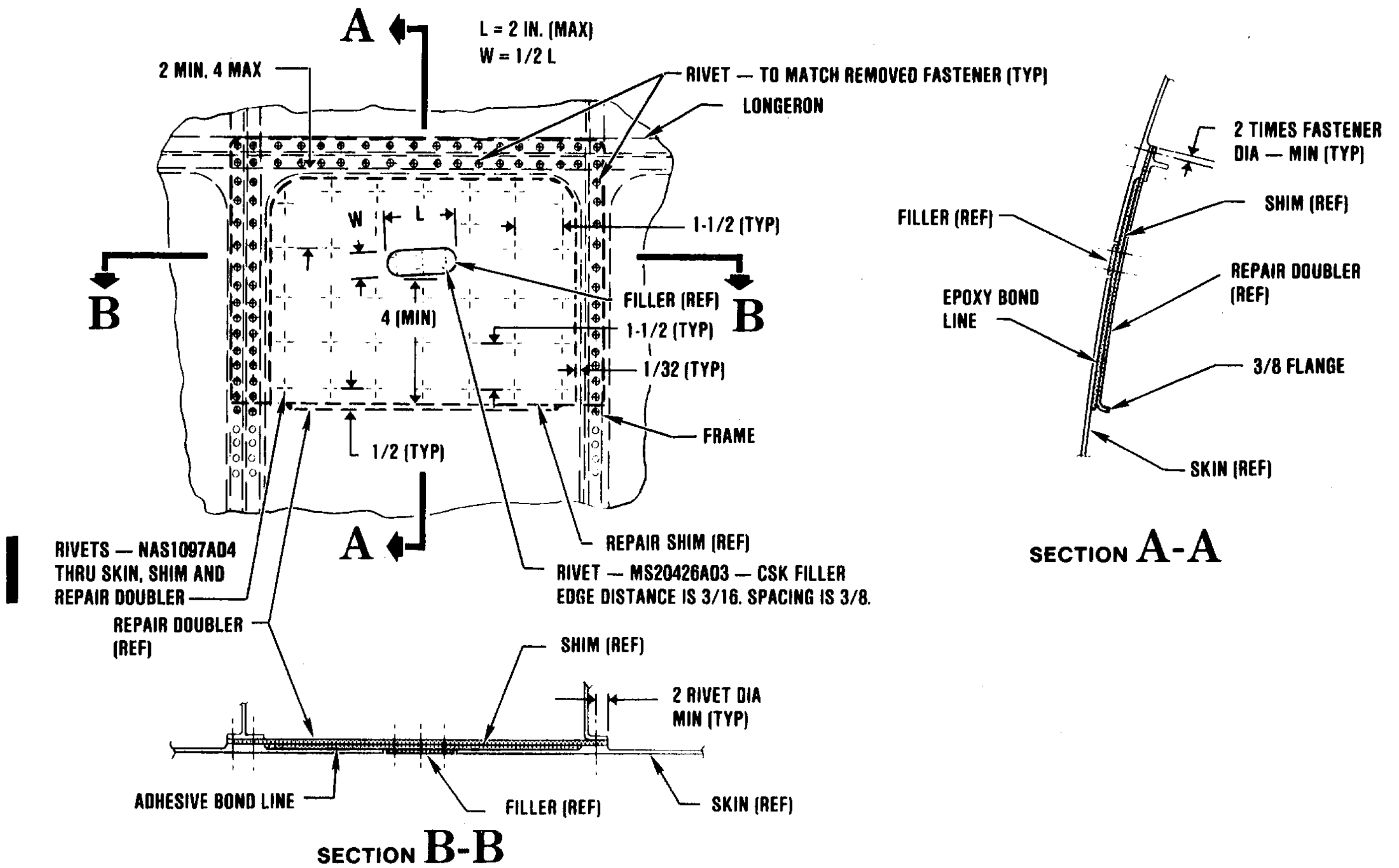
1. Bond shim to skin.
2. Rivet filler to shim, using 3/16 in. edge distance and approximately 3/8 in. spacing (NAS1097AD5).
3. Install repair doubler using NAS1097AD5 rivets. Use PR1431G sealant between mating surfaces.

NOTE

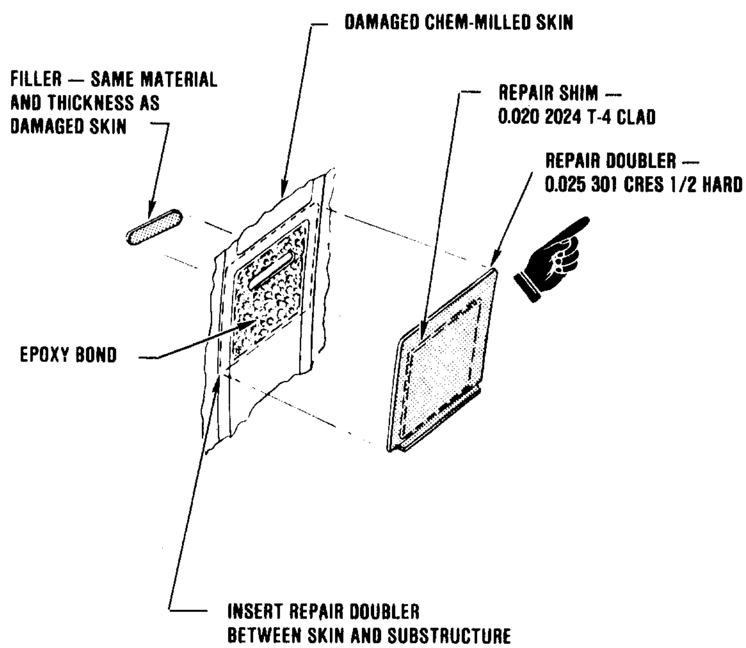
This repair may be used in pressurized areas where damage is not greater than a 4 in. dia hole.

S370-3-56

Chem-milled Skin Repair — Damage Less than 4 In. Diameter — Pressurized Area
Figure 203 (Sheet 1 of 2)

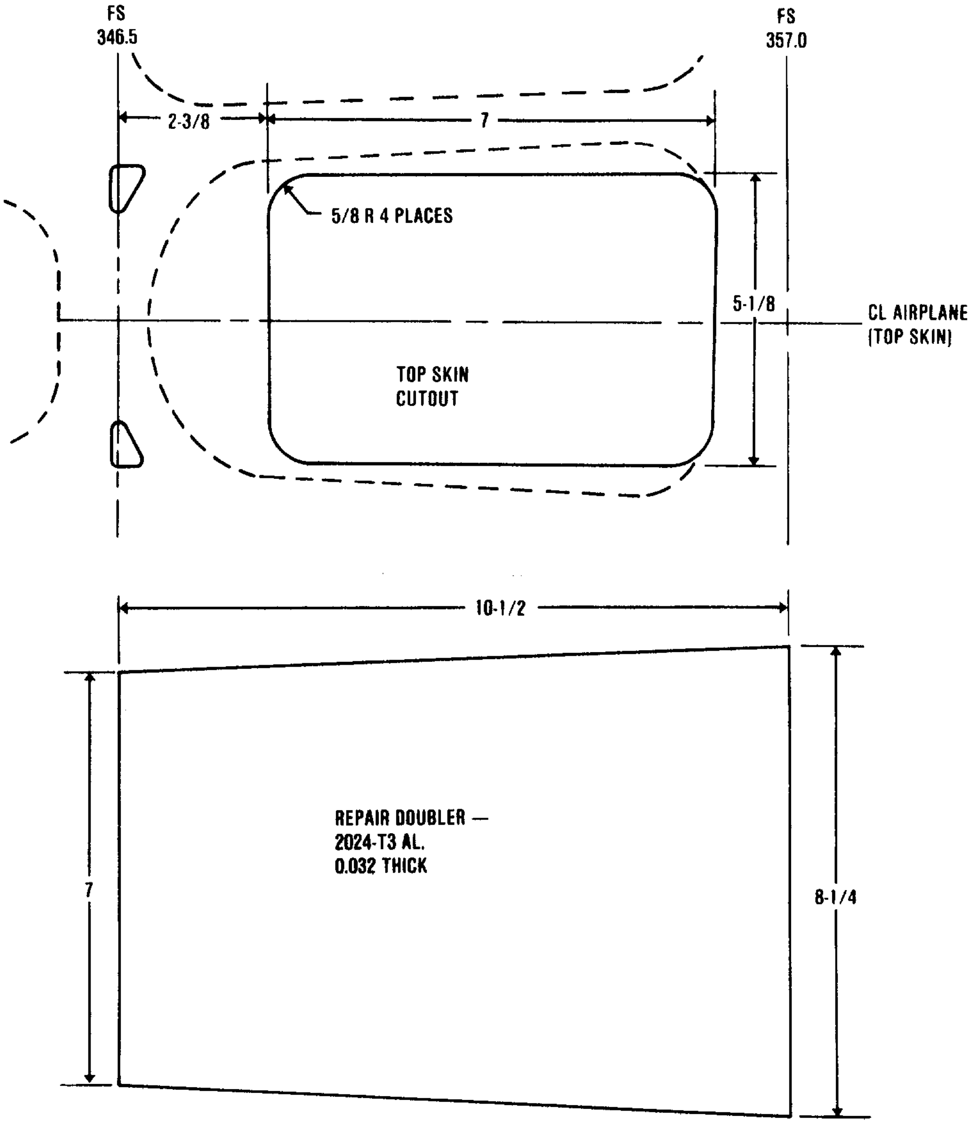


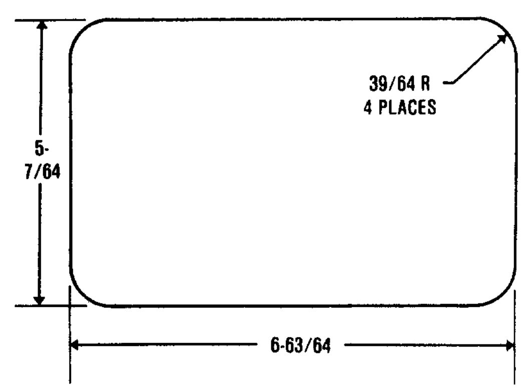
1. Trim out damage. Damage may be trimmed to a circular shape, but must not exceed 1-1/2 in. in dia.
2. Remove rivets through skin and substructure as necessary for installation of repair doubler.
3. Fabricate repair parts.
4. Prepare skin and repair shim for bonding (refer to 51-20-20).
5. Rivet repair doubler in place using PR1431G sealant between all mating surfaces. Accomplish riveting while bond adhesive is still soft (refer to 51-20-20).
6. Deleted.
7. Deleted.



Chem-milled Skin Repair — Damage Less Than 4 In. Diameter — Pressurized Area
Figure 203 (Sheet 2 of 2)

S370-3-57





1 Open aft fuselage access doors and fuselage fuel level tank unit access doors adjacent to leading edge of dorsal fin.

2 From inside of aft fuselage, remove ram-air duct from centerline FS 357 to top of heat exchanger.

3 Remove inlet air duct fairing, duct, and formers.

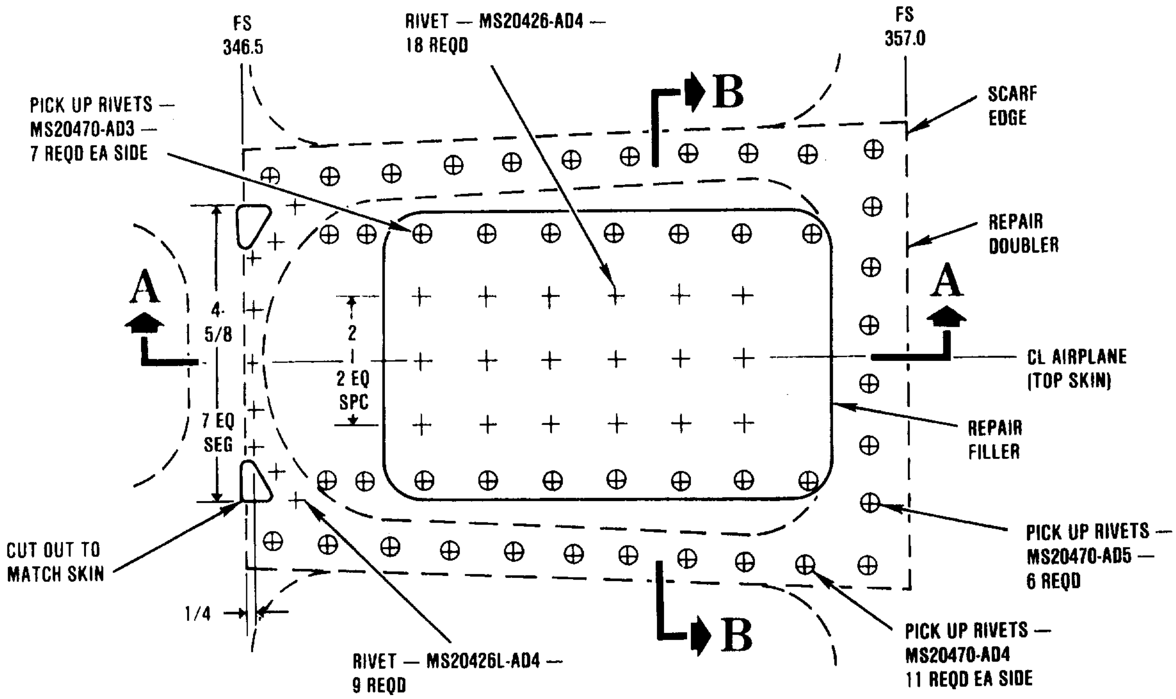
4 Cut out damaged skin as indicated.

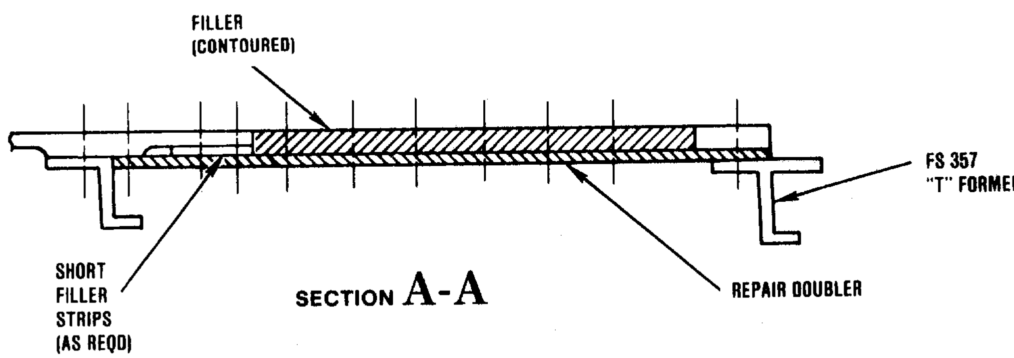
5 Fabricate repair doubler and cutout filler as shown.

NOTE

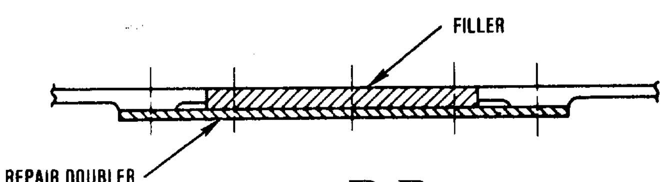
THIS SKIN AREA FORMS FLOOR FOR CABIN RAM-AIR INLET DUCT FWD OF DORSAL FIN. TO GAIN ACCESS FROM OUTSIDE, IT IS NECESSARY TO REMOVE RAM-AIR INLET DUCT FAIRING, INLET DUCT, AND DUCT FORMERS.

Chem-milled Skin Repair — Non-Pressurized Area —
Top Centerline Between Fuselage Stations (FS) 346.5 and 357
Figure 204 (Sheet 1 of 2)





SECTION A-A



SECTION B-B

NOTES

- REPAIR MEMBERS TO MATCH CONTOUR OF CURVE

LEGEND

⊕ EXISTING RIVETS

+ ADDITIONAL RIVETS

6 Insert repair doubler between skin and formers, adding cutouts necessary to match existing skin. Insert and tack two short filler strips.

7 Finish repair parts per Section 1.

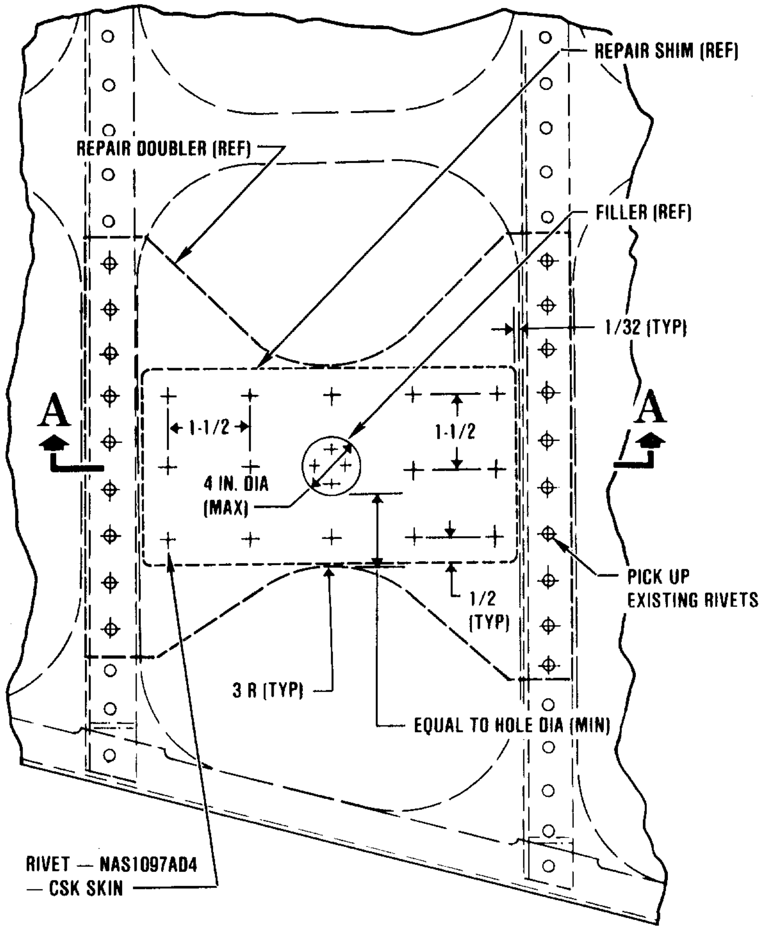
8 Install repair parts.

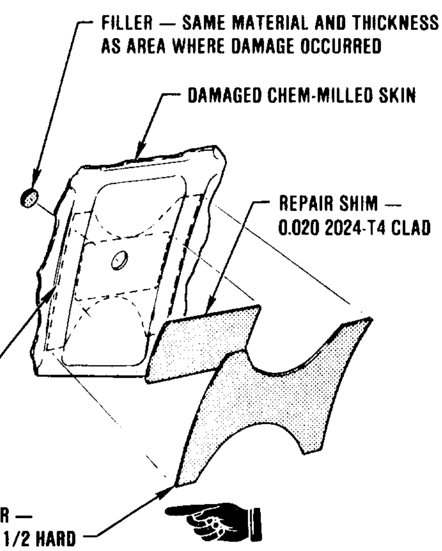
9 Install removed system components.

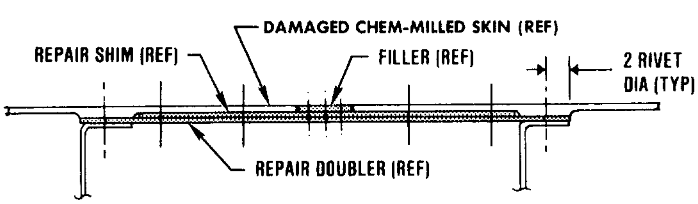
10 Clean up and close out compartments.

S370-3-59

Chem-milled Skin Repair — Non-Pressurized Area —
Top Centerline Between Fuselage Stations (FS) 346.5 and 357
Figure 204 (Sheet 2 of 2)







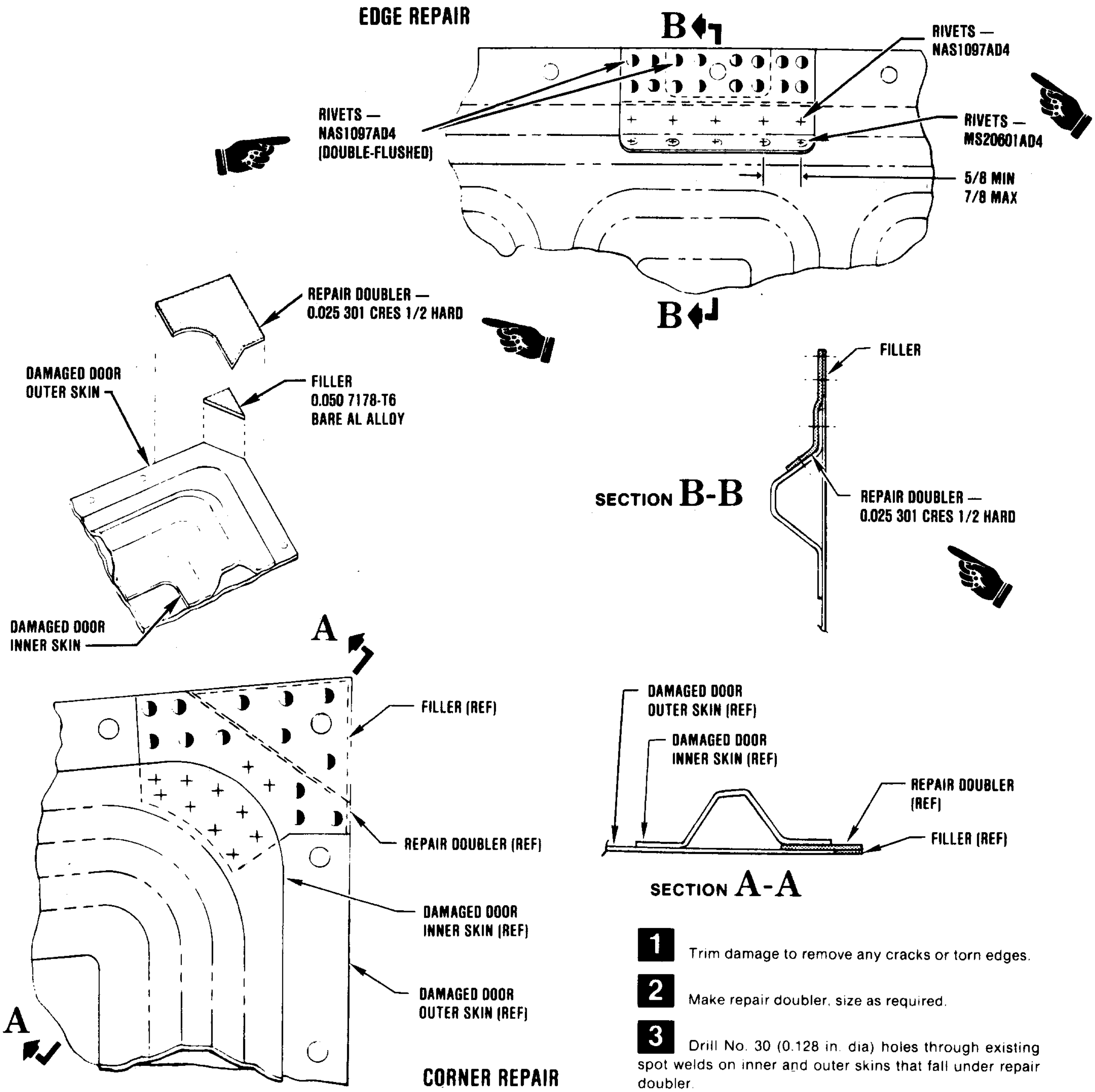
SECTION A-A

NOTE

This repair may be used on* non-pressurized areas only, *where damage is not greater than a 4 in. dia hole.

1. Install doubler between skin lands and frame flanges. Install shim between doubler and skin.
2. Using NAS1097AD4 rivets, attach filler to double-shim assembly. Use 3/16 in. edge distance and about 3/8 in. spacing.
3. Pick up existing fasteners through skin, repair doubler, and frame flanges.
4. Rivet repair doubler and shim to skin. Rivets NAS1097AD4 through skin, shim, and repair doubler.

Chem-milled Skin Repair — Non-Pressurized Areas
Figure 206



1 Trim damage to remove any cracks or torn edges.

2 Make repair doubler, size as required.

3 Drill No. 30 (0.128 in. dia) holes through existing spot welds on inner and outer skins that fall under repair doubler.

4 Insert repair doubler between inner and outer skins and pick up drilled spot-weld holes. Add additional rivets if required to meet spacing requirements.

5 Double-flush fasteners indicated by coding if conventional rivets would interfere between door and door land.

6 Make filler to match trimmed-off damaged area and fasten in place, using size and type of fasteners required.

7 Reinstall Camloc fastener in original position.

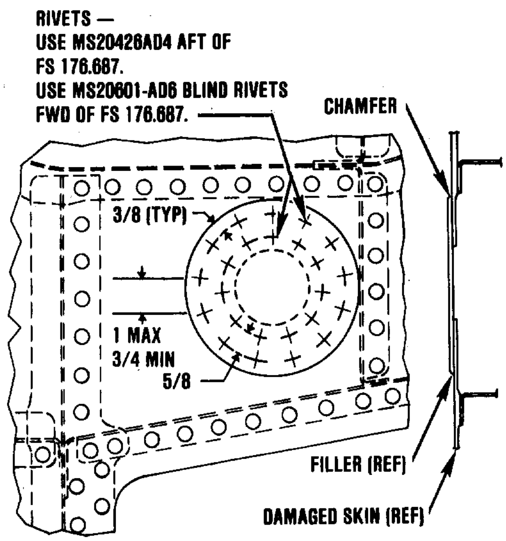
NOTES

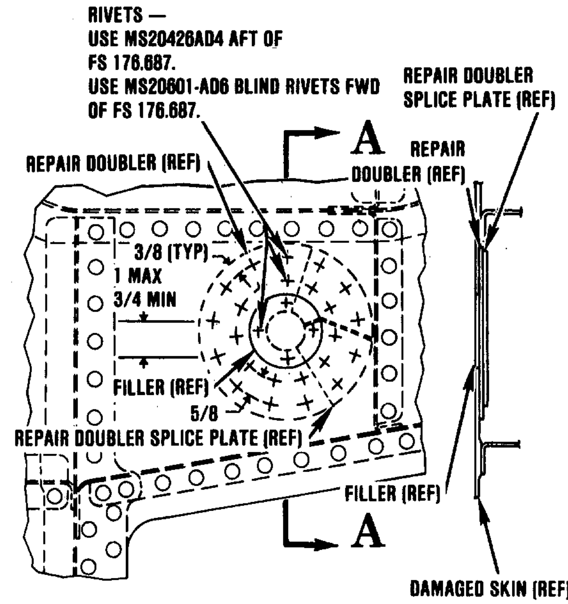
- REPAIRS SHOWN ARE APPLICABLE TO ALL DOUBLE-SKIN DOORS AND COVERS INSTALLED WITH CAMLOC QUICK-ACTING FASTENERS.
- EDGE REPAIR MAY BE EXTENDED TO PICK UP THREE CAMLOC FASTENERS.
- RIVET EDGE DISTANCE IS TWO TIMES FASTENER DIA (MIN). RIVET SPACING IS 1/2 IN (MIN), 7/8 IN (MAX).

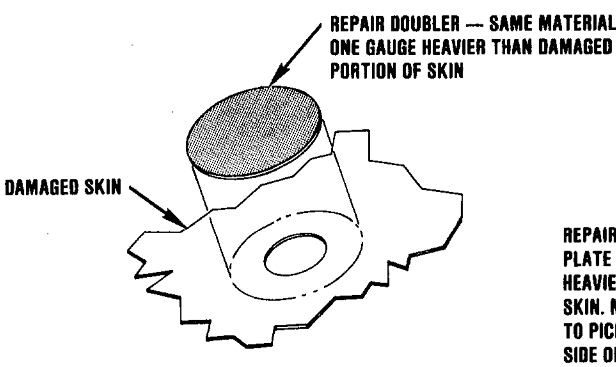
LEGEND

◗ **NAS1097AD4 Rivets, Double-Flushed.**

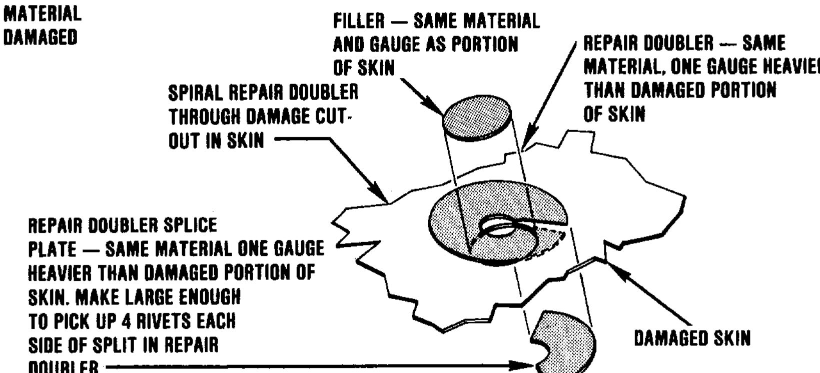
Figure 207 — Nonstructural Door Repairs





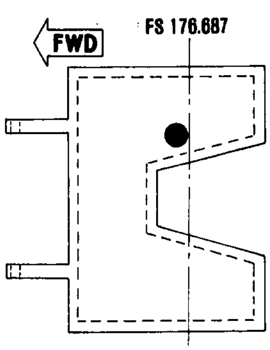


TEMPORARY REPAIR
(WHEN USED ON OUTER SKIN)



PERMANENT REPAIR
(OUTER SKIN ONLY)

SECTION A-A



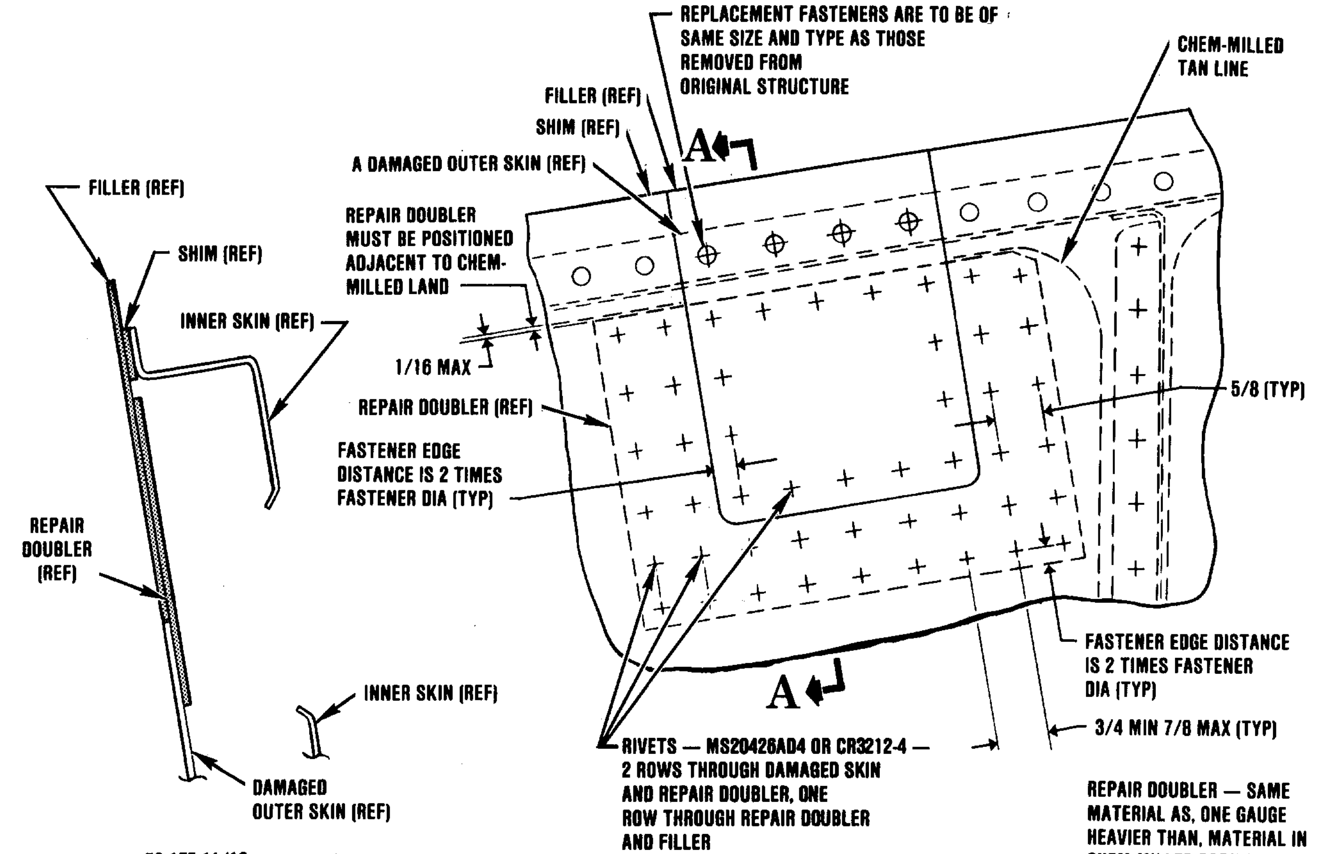
1. Clean out damage. Smooth all edges and corners.
2. Make filler, repair doublers, and repair doubler splice plate from material called out as required.
3. Lay out rivet pattern on repair doubler and repair doubler splice plate.
4. Place repair doubler in position and drill rivet holes through skin and repair doubler.
5. If repair is to be temporary, chamfer repair doubler and rivet in place, using size and type of rivets required.
6. For permanent repair, secure repair doubler splice plate to one end of repair doubler with small flush tack rivets. Spiral repair doubler into position through damage cut out.
7. Rivet repair doubler and repair doubler splice plate to damaged skin with size and type of fasteners required.
8. Fasten filler to repair doubler with size and type of fasteners and spacing called out.

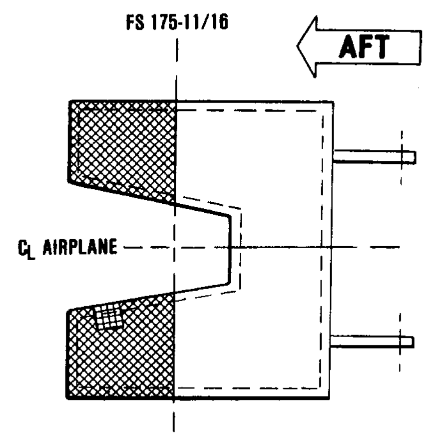
NOTES

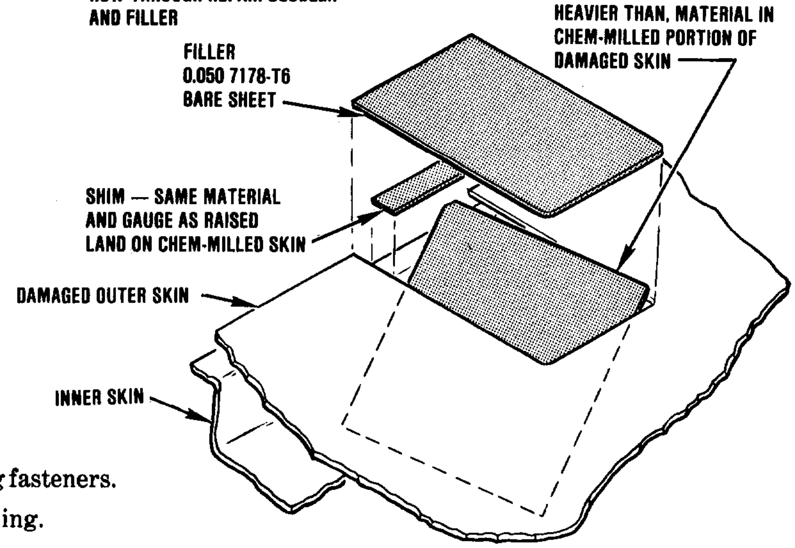
- ***Max damage size after clean-up is 3 in.***
- ***Min distance of 5/16 in. must be maintained between repair rivets and existing beam webs or flanges.***

Speed Brake Skin Repairs
Figure 208 (Sheet 1 of 3)

S265-3-154





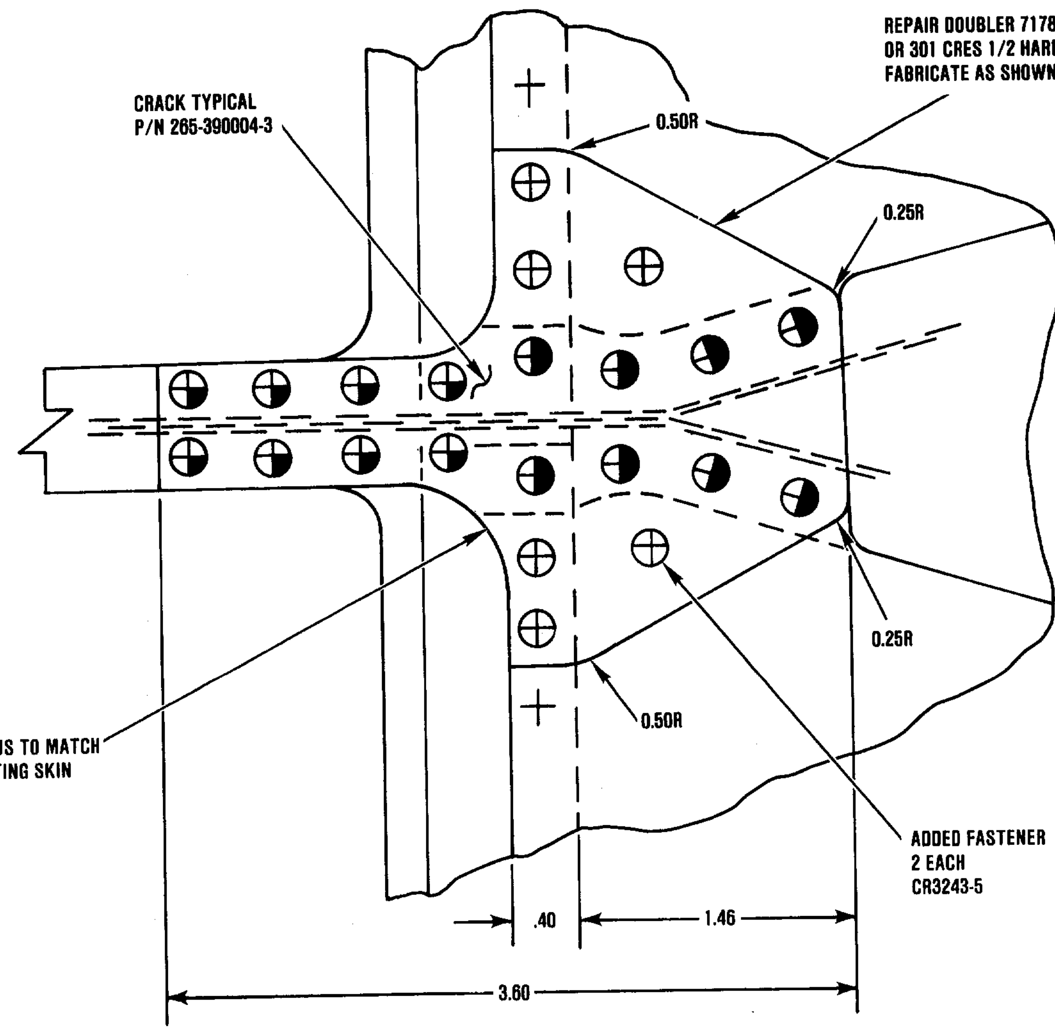


1. Trim out damage midway between existing fasteners.
2. Smooth all edges and corners after trimming.
3. Make repair doubler and filler. Use same material type and material thickness indicated on this illustration.
4. Fasten repair parts in place, using size and type of fasteners and spacing called out.

NOTE

This repair is applicable to areas of speed brake aft of FS 175 11/16.

Speed Brake Skin Repairs
Figure 208 (Sheet 2 of 3)



1. Stop drill crack using No. 30 drill.
2. Fabricate repair doubler as shown.
3. Pick up 20 existing fastener locations.
4. Pick up 2 additional fastener locations.
5. Prime all parts with epoxy polyamide primer.
6. Install repair doubler using faying surface sealant.

LEGEND

PRIMER MIL-P-23377C

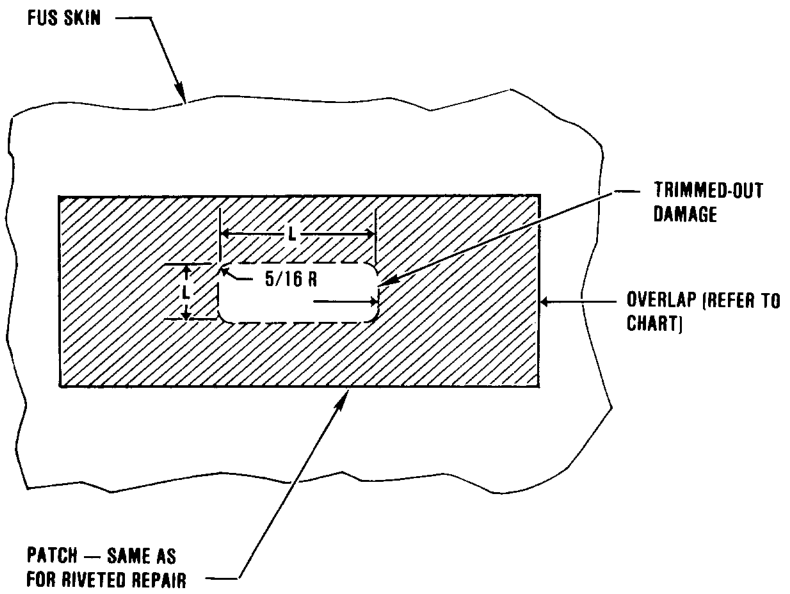
SEALANT PR1431G OR EQUIVALENT

(half-filled symbol) = MS20470AD5 RIVET 8 EA

(half-filled symbol) = VA1023-6 JO BOLT 8 EA

(open symbol) = CR3243-5 CHERRY MAX 2 EA
CR3243-6 CHERRY MAX 4 EA

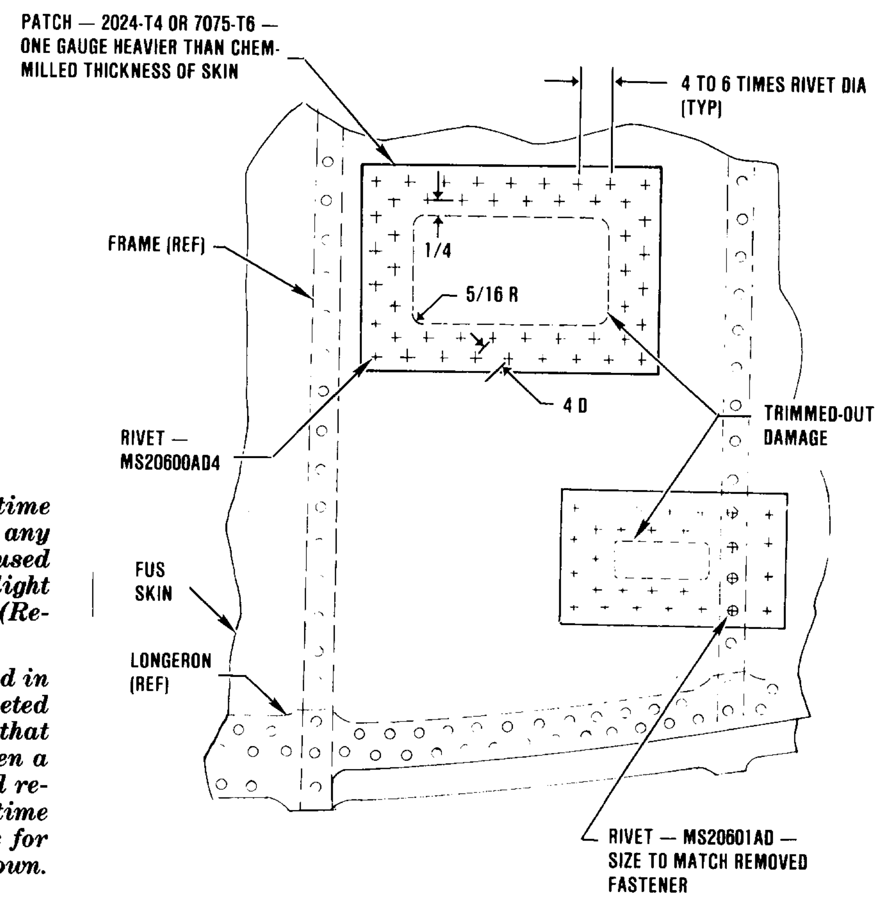
Figure 208 — Speed Brake Skin Repairs (Sheet 3 of 3)



BOND OVERLAP

DAMAGE LENGTH "L" (IN.)	OVERLAP EACH SIDE OF DAMAGE (IN.)
UP TO 2	2
2 TO 4	3-1/2
4 TO 6	5

BONDED REPAIR



NOTES

- ***Repairs shown may be used as one-time (restricted) ferry flight repairs on any area of fuselage. When either repair is used on areas affected by cabin pressure, flight must be made without pressurization. (Refer to 51-00-10.)***
- ***One of the following must be considered in selection of type of repair to use: (1) riveted repair will enlarge damaged area, as that area will have to be trimmed out when a permanent repair is made. (2) bonded repair will require considerably more time —time for effecting repair, and time for repair to cure before airplane can be flown. (Refer to 51-20-20.)***

BONDED REPAIR

S370-3-55

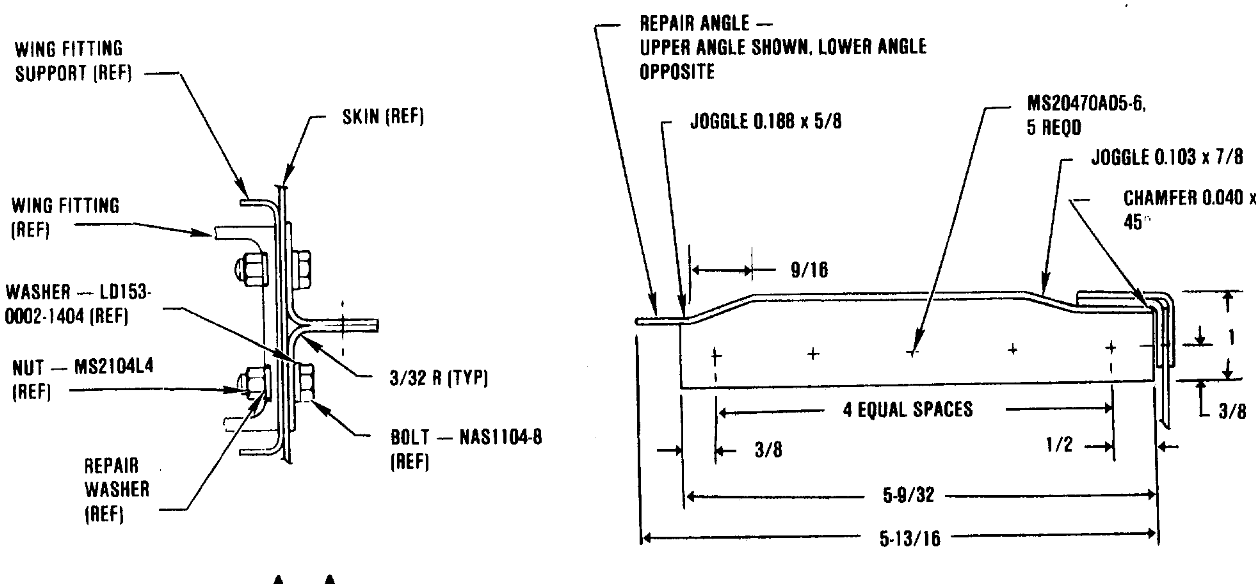
Fuselage Skin — One Time Flight Repair
Figure 209

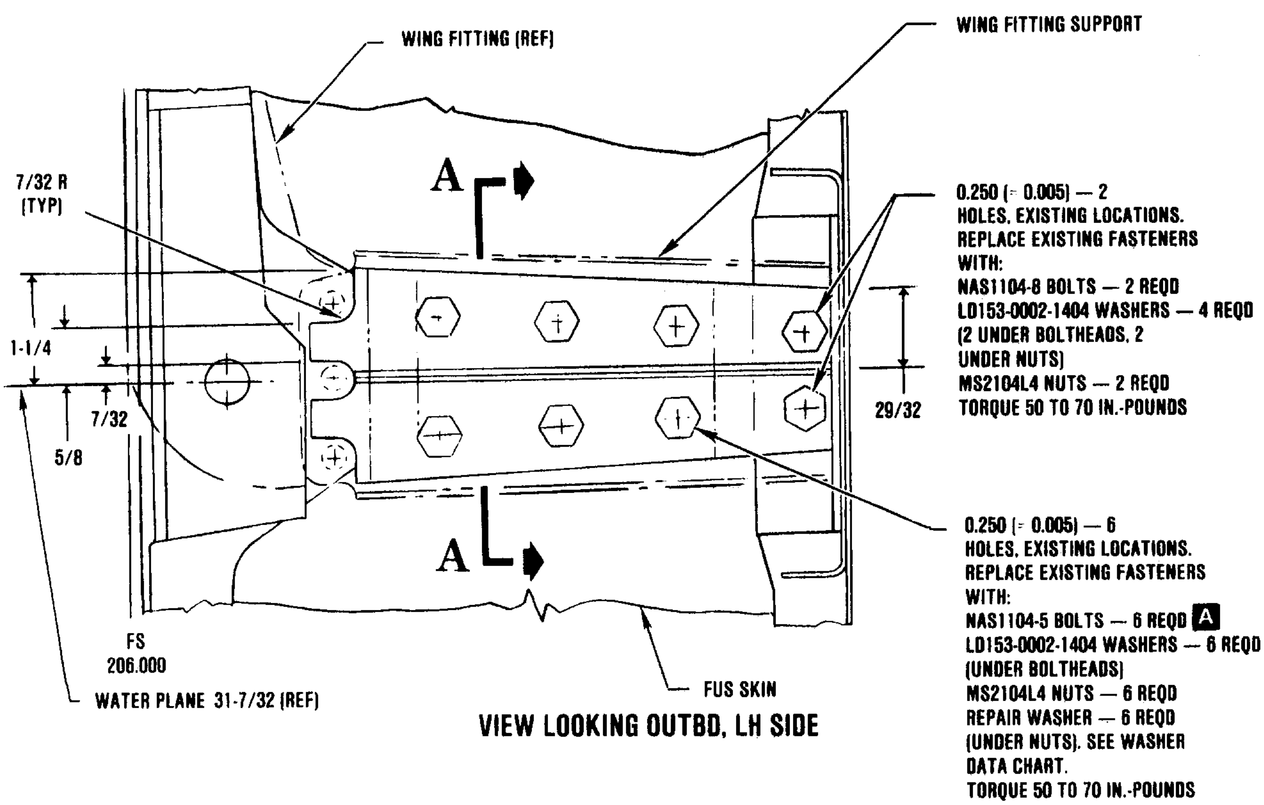
ATTACH FITTINGS

REPAIRS

GENERAL

This section contains repairs to the fuselage fittings used for the attachment of doors, wings, landing gear, etc. See figure 201 through 204. For applicability of repairs, refer to section 53-10-00.





NOTE

A LD153-002-1404 IS A SABRELINER PART NUMBER. FOR PROCUREMENT. REFER TO SOURCE KEY 017. IN 51-30-00. WASHER MAY BE LOCALLY MANUFACTURED SEE WASHER DATA CHART. (SHEET 2)

S265-3-158

Wing-to-Forward Fuselage Attach Fitting Repair
Figure 201 (Sheet 1 of 2)

1 Fabricate and heat-treat repair angles.

2 Chemical-film-treat and zinc-chromate-prime repair angles.

3 Fabricate and finish repair washers and LD153-0002-1404 washers as required.

4 Remove either upper or lower horizontal row of fasteners (water plane — 31-7/32) in wing fitting. Position corresponding repair angle on inner side of skin and locate fastener holes from fuselage skin.

5 Drill temporary No. 11 holes in repair angle and bolt angle in place with 2-3/16 in. bolts.

6 Line-drill two open holes, from repair angle side, with 15/64 in. drill and line-ream holes to 0.250 (±0.0005) in.

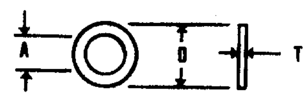
7 Install NAS1104 bolts in prepared holes and repeat step 6 on two remaining No. 11 holes.

8 Install NAS1104 bolts in two remaining holes.

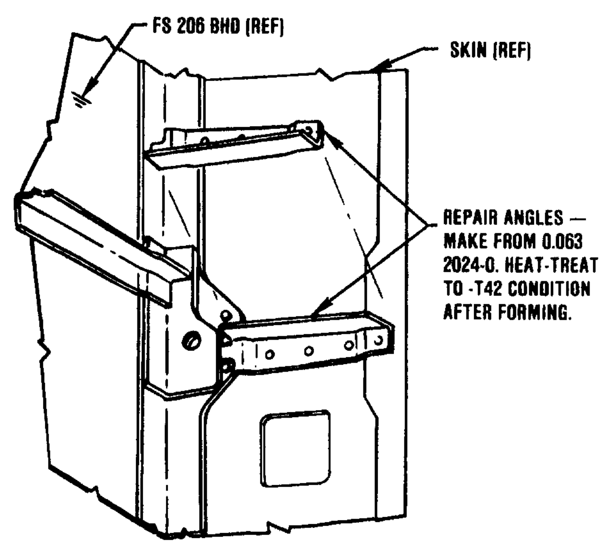
9 Remove remaining horizontal row of fasteners in wing fitting. Position second repair angle (horizontal flanges must be in contact), locate fastener holes, and repeat steps 5 through 8.

10 Rivet horizontal flanges of repair angles together.

WASHER DATA



WASHER	A	D	T	MATERIAL	FINISH
LD153-0002-1404	0.265	0.450	0.063	7075-T6	ANODIZE OR CHEMICAL FILM-TREAT
REPAIR WASHER	0.257	0.375	0.063		

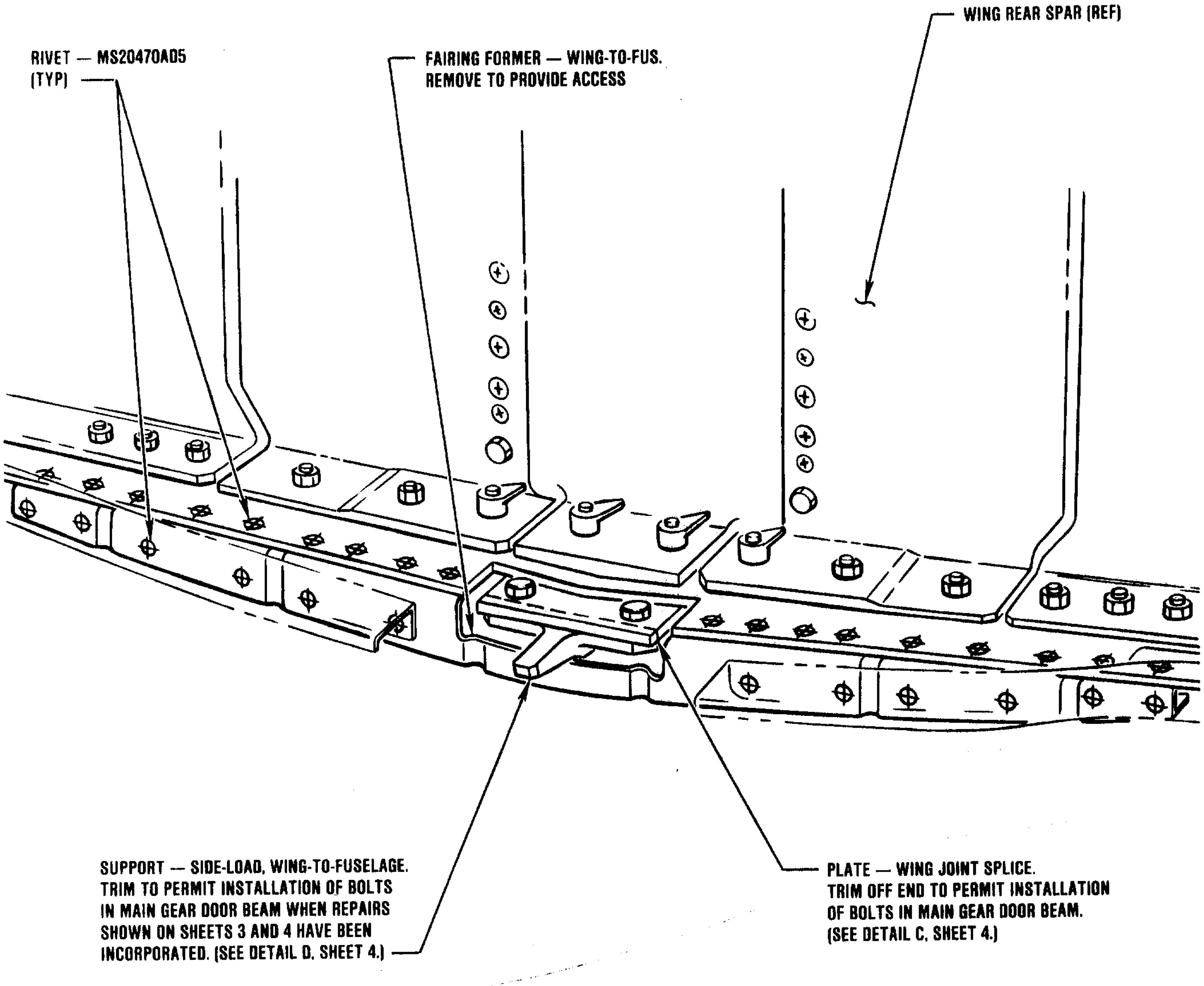


NOTE

INSTALL ONE ANGLE AT A TIME. DO NOT REMOVE MORE THAN FOUR FASTENERS THROUGH WING FITTING AT ONE TIME.

S265-3-159

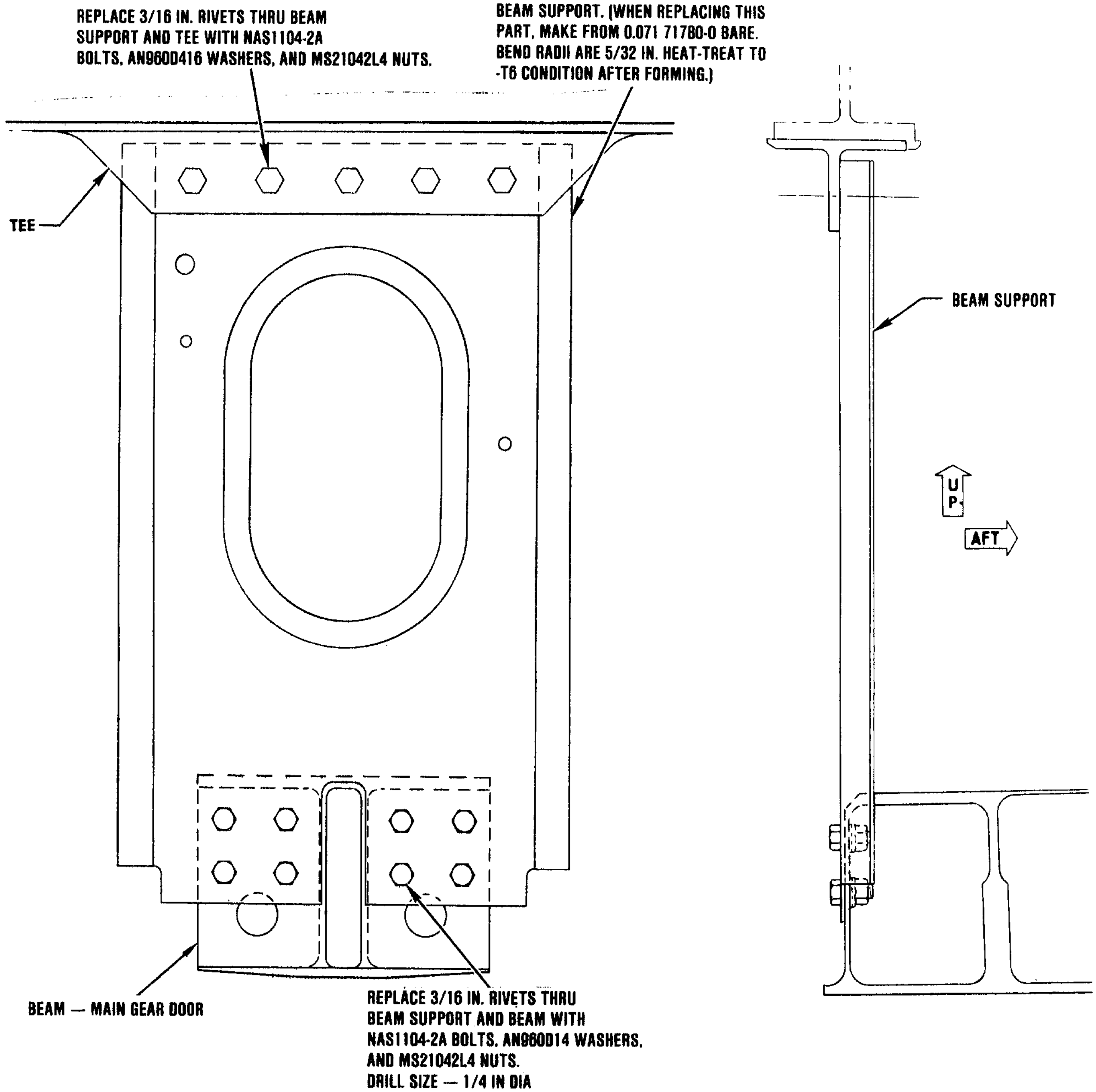
Wing-to Forward Fuselage Attach Fitting Repair
Figure 201 (Sheet 2 of 2)



NOTES

- REPAIRS SHOWN IN THESE ILLUSTRATIONS ARE APPLICABLE TO FWD END OF MAIN GEAR DOOR BEAM AND BEAM SUPPORT AT FS 264.25.
- WHEN RIVET HOLES ARE ELONGATED IN UPPER END OF BEAM SUPPORT, OR IN EITHER MEMBER OF BEAM-SUPPORT-TO-BEAM JOINT, REPLACE RIVETS WITH 1/4 IN. BOLTS IF ELONGATION IS REMOVED WITH THAT DIA HOLE.
- WHEN A 1/4 IN. DIA HOLE DOES NOT REMOVE ALL ELONGATION IN BEAM SUPPORT TOP FASTENER HOLES, REPLACE BEAM SUPPORT.
- WHEN A 1/4 IN. HOLE DOES NOT REMOVE ALL ELONGATION IN EITHER MEMBER OF BEAM-SUPPORT-TO-BEAM JOINT, REPLACE AFFECTED MEMBER(s) AS SHOWN ON SHEETS 3 AND 4.

Main Landing Gear Door Beam Repairs — Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 1 of 5)



VIEW LOOKING AFT, FS 264.25

NOTE

A FOR REPAIR OF BEAM-SUPPORT-TO-BEAM JOINT.

1 Remove wing-to-fuselage side-load support and wing-to-fuselage fairing former. **A**

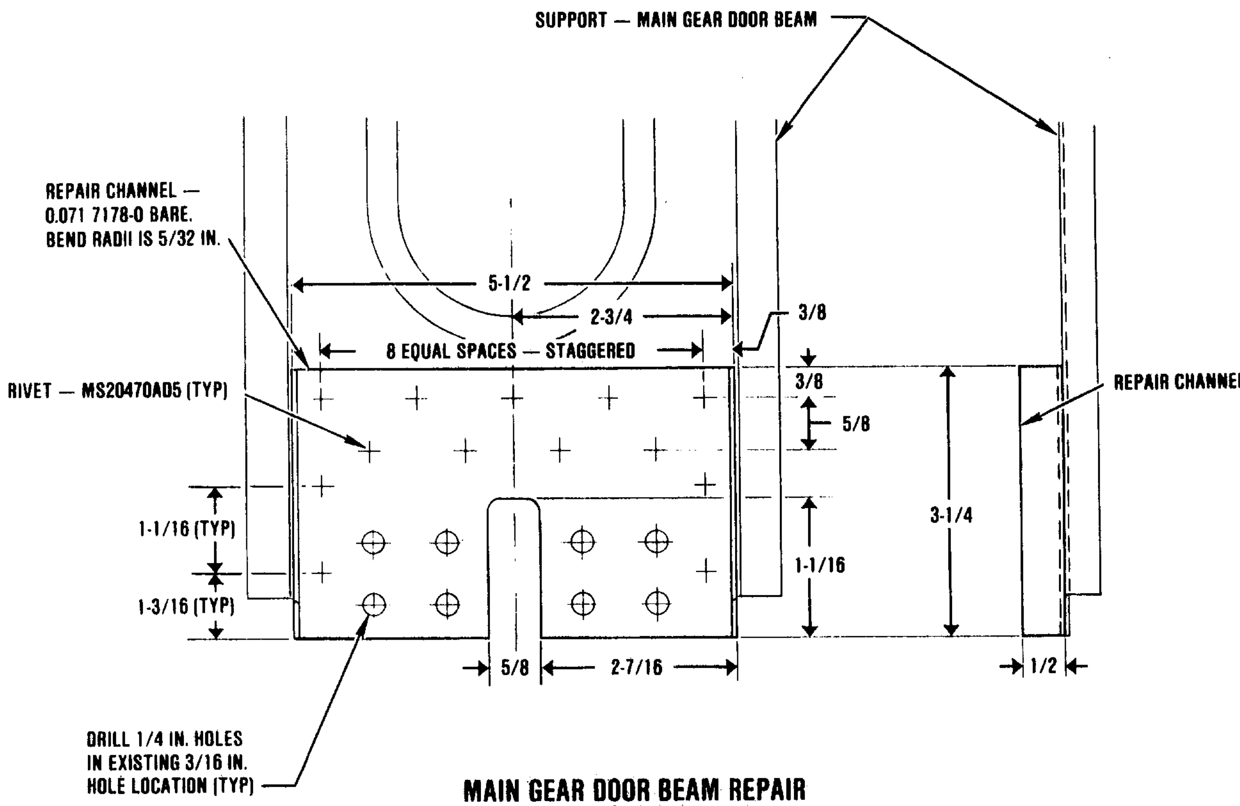
2 Rework wing joint splice plate. **A** (See detail C, sheet 4.)

3 Drill holes for 1/4 in. bolts.

4 Install 1/4 in. bolts as shown.

5 Replace wing-to-fuselage fairing former and wing-to-fuselage side-load support. **A**

**Main Landing Gear Door Beam Repairs —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 2 of 5)**



MAIN GEAR DOOR BEAM REPAIR

1 Remove wing-to-fuselage side-load support and wing-to-fuselage fairing former (sheet 1). Remove main gear wheel door lock torque tube support as required.

2 Rework wing joint splice plate. (See detail C, sheet 4.)

3 Rework wing-to-fuselage side-load support. (See detail D, sheet 4.)

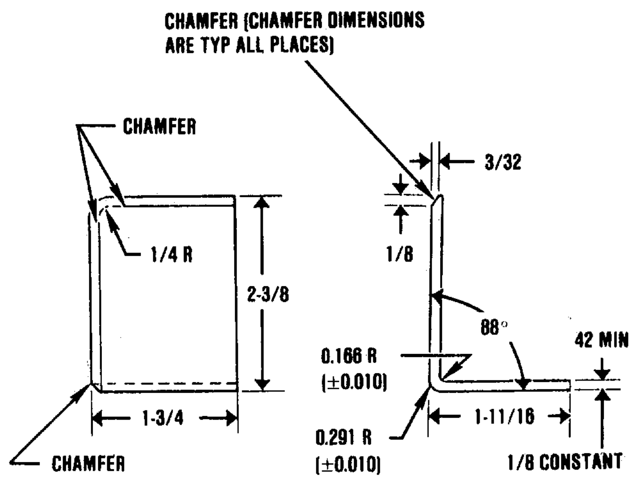
4 Rework main gear wheel door lock torque tube support as required.

5 Fabricate repair parts as required.

6 Heat-treat formed repair parts to the -T6 condition after forming.

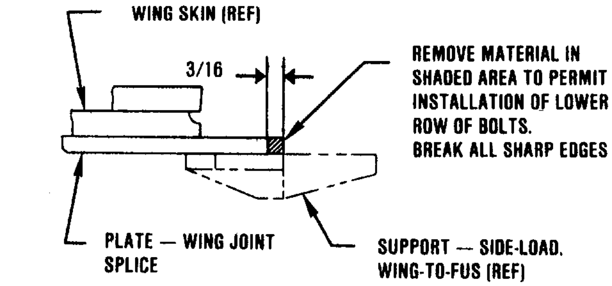
7 Prime repair parts and bare surfaces of reworked parts

8 Install repair parts and reworked parts. See detail F, sheet 4, for bolt installation.

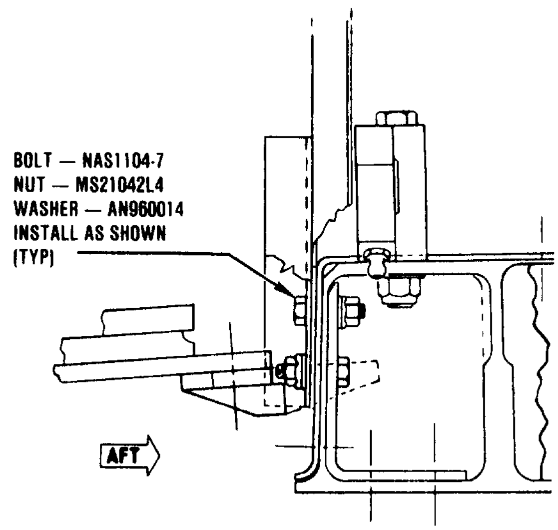


DETAIL A — FABRICATION DETAILS OF MAIN GEAR DOOR BEAM INNER REPAIR ANGLES
LEFT HAND SHOWN, RIGHT HAND OPPOSITE.
MACHINE ANGLES FROM 7075-T6 BAR.

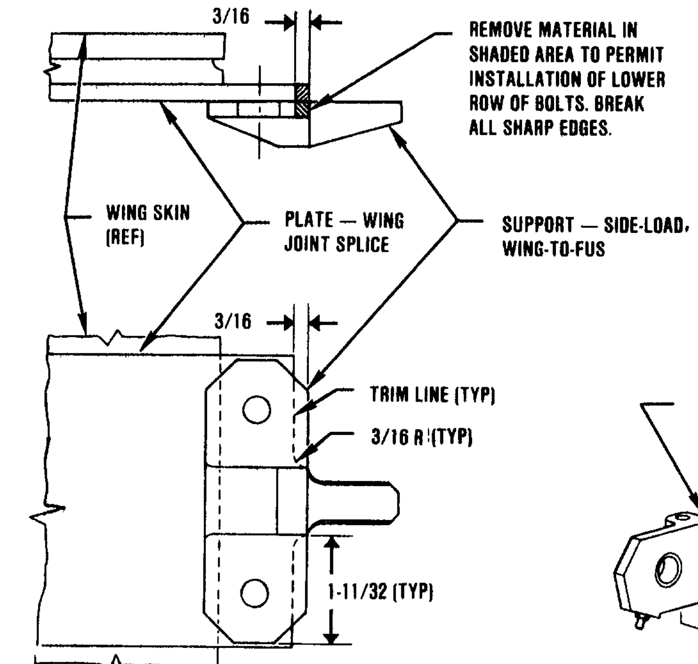
Main Landing Gear Door Beam Repairs — Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 3 of 5)



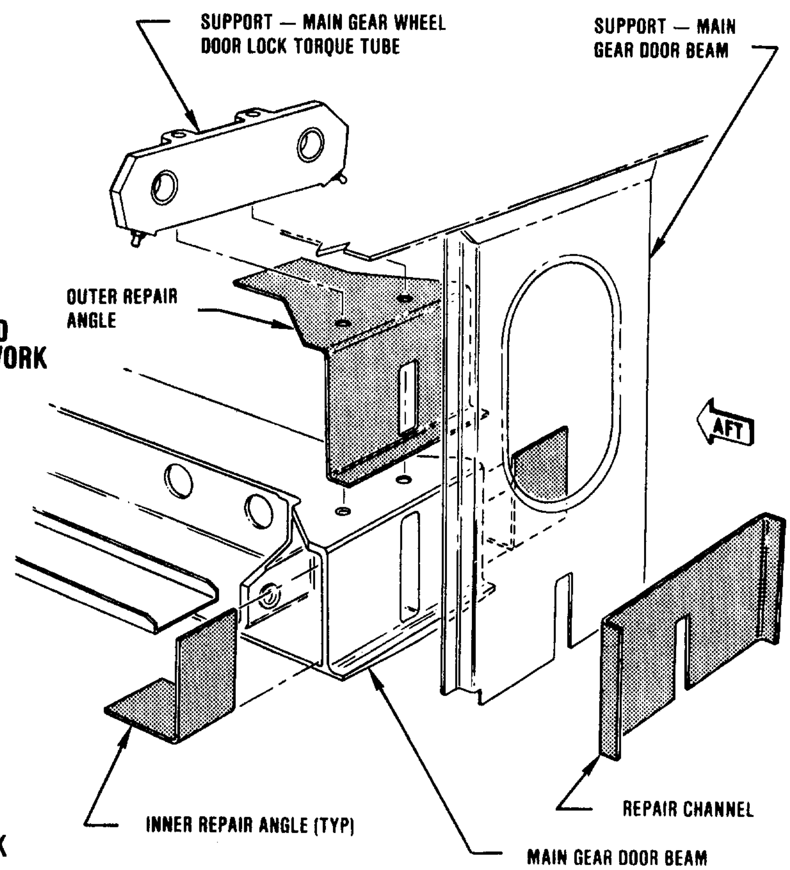
DETAIL C — WING JOINT SPLICE PLATE REWORK

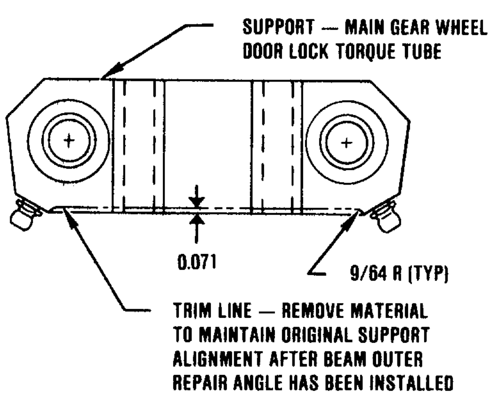


DETAIL F — BOLT INSTALLATION IN REPAIRED MAIN GEAR DOOR BEAM AND BEAM SUPPORT



DETAIL D — WING JOINT SPLICE PLATE AND WING-TO-FUSELAGE SIDE-LOAD SUPPORT REWORK

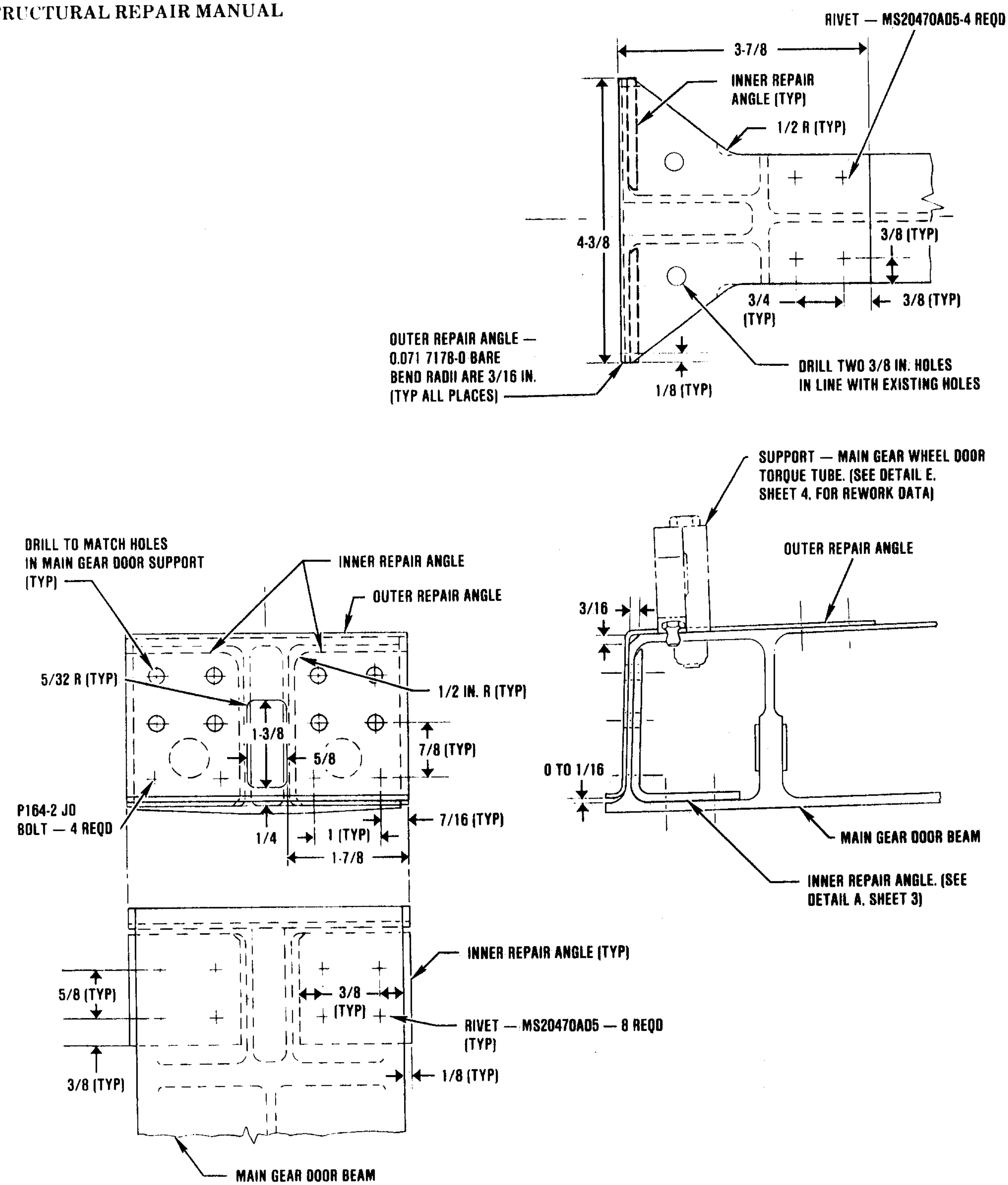




DETAIL E — MAIN GEAR WHEEL DOOR LOCK TORQUE TUBE SUPPORT REWORK

S265-3-163

Main Landing Gear Door Beam Repairs —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 4 of 5)

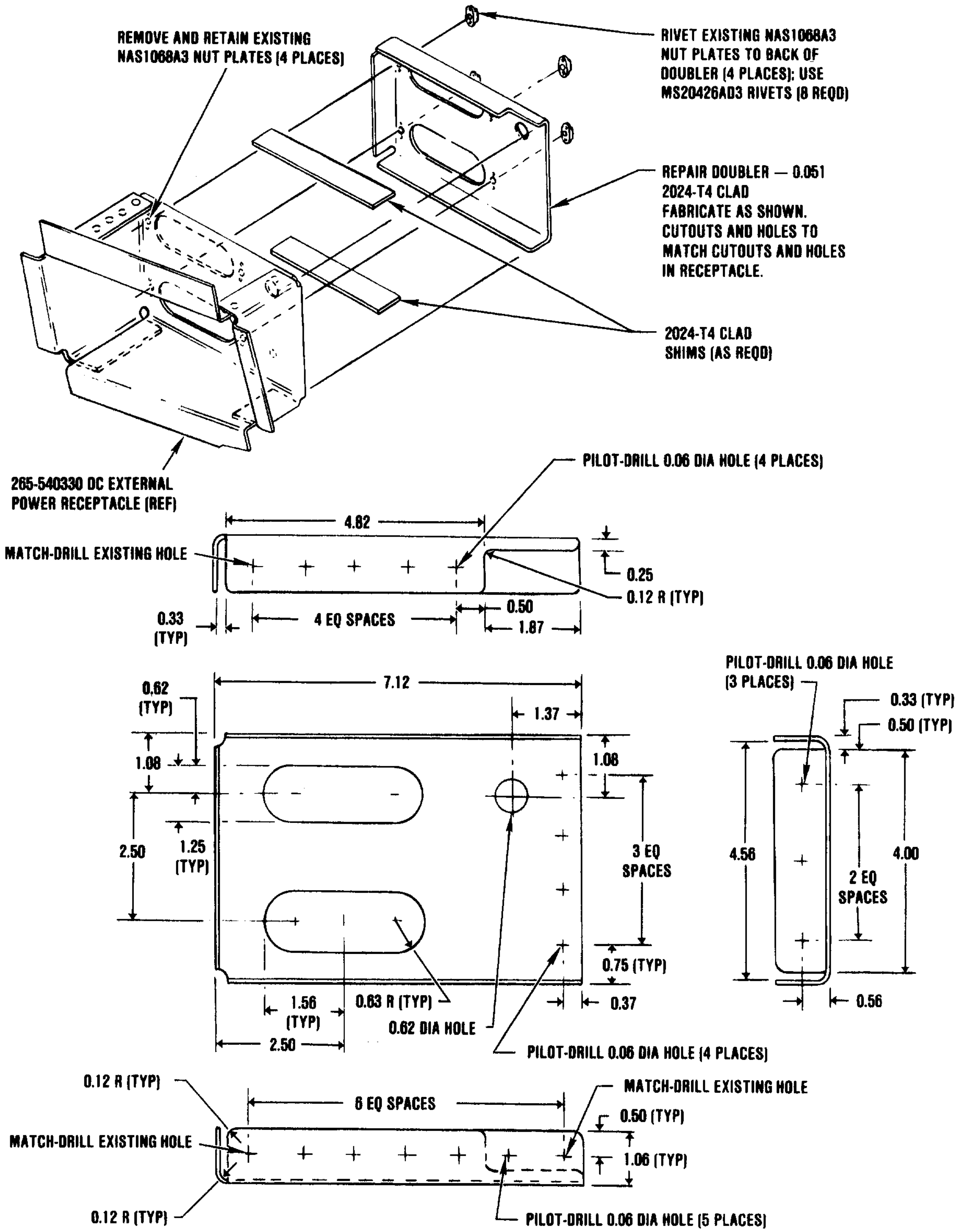


MAIN GEAR DOOR SUPPORT REPAIR

NOTE

SURFACES OPPOSITE VIEW SHOWN ARE OMITTED FOR CLARITY.

Main Landing Gear Door Beam Repairs —
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 202 (Sheet 5 of 5)

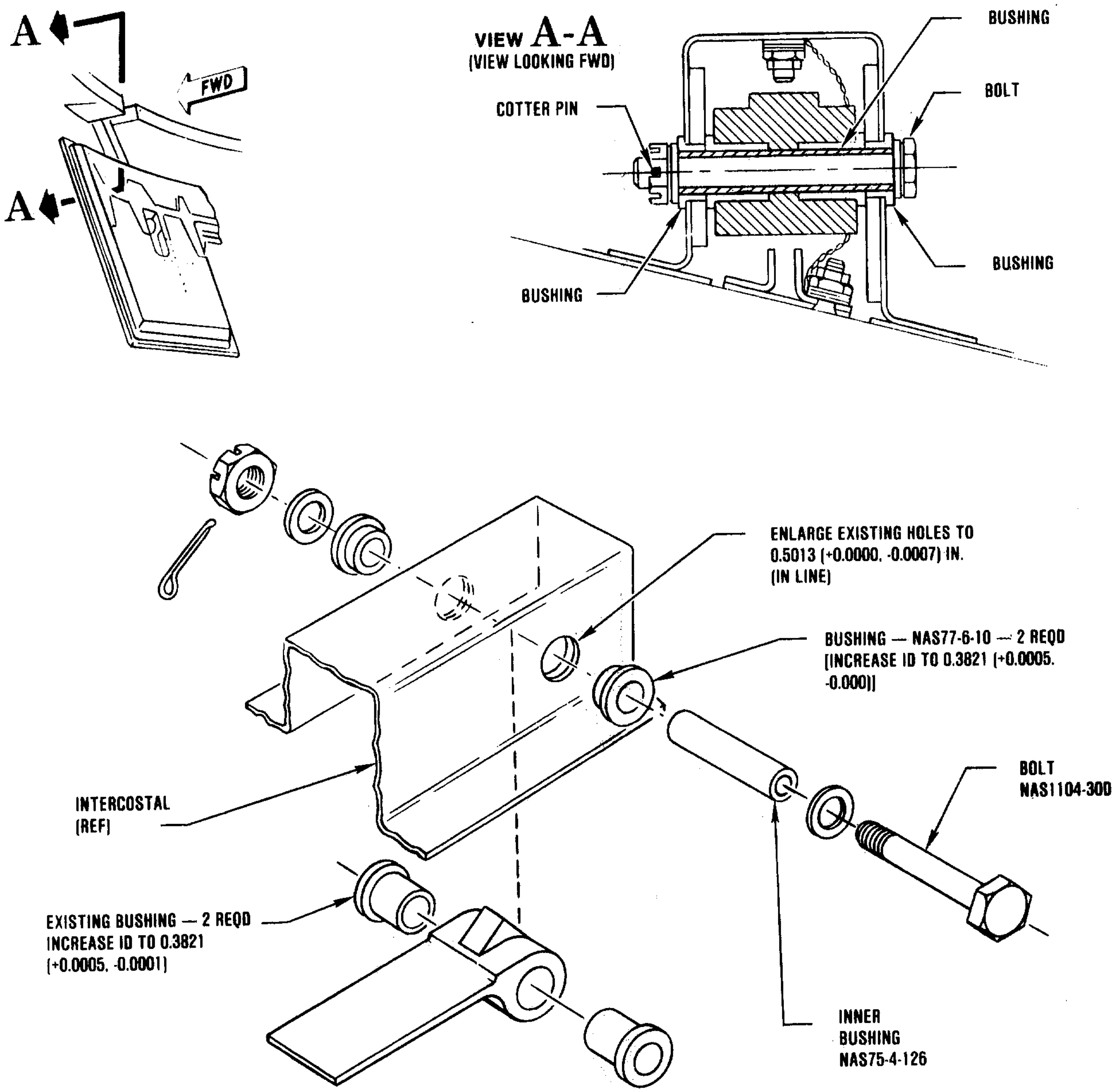


NOTE

TO REPAIR CRACKED EXTERNAL POWER RECEPTACLE SUPPORT, FABRICATE REPAIR DOUBLER AS SHOWN AND ATTACH WITH MS20470-AD5 RIVETS.

S265-3-165

External Power Receptacle Repair —
Model NA 265-40, -60, -60A, and -60SC
Figure 203



INTERCOSTALS — FS 150 TO 158.50, BP 12-7/8

1 Drill out existing speed brake hinge pivot holes in intercostals to 0.500 in. dia.

2 Line-ream 0.500 in. dia holes to 0.5013 (+0.0000, -0.0007) in. dia.

3 Install NAS77-6-10 bushings (with flanges on the outer surfaces) in line-reamed holes in intercostal.

4 Line-ream installed bushings to an inside dia of 0.3821 (+0.0005, -0.0000) in.

SPEED BRAKE HINGE

1 Line-ream existing bushings (two in each speed brake hinge) to an inside dia of 0.3821 (+0.0005, -0.0000) in.

2 Replace existing inner bushing with an NAS75-4-126 bushing.

3 Replace existing bolt through intercostal and speed brake hinge with an NAS1104-30D bolt.

S370-3-60

Repair of Speed Brake Hinge — Hole Elongation —
Model NA 265-40, -60, -70, and -80
Figure 204

CHAPTER

54

NACELLES PYLONS

CHAPTER 54

NACELLES AND PYLONS

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NACELLES AND PYLONS

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NACELLES AND PYLONS

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	202	Aug 17/84
	203/204	Aug 17/84

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER 54

NACELLES AND PYLONS

STRUCTURAL IDENTIFICATION

GENERAL

Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)

The nacelles are cantilevered from the fuselage on an airfoil-shaped pylon. Each nacelle consists of a fixed stainless-steel fire wall integral with the pylon, three upper fairing doors, one lower fairing door, and an aluminum nose section containing the engine air inlet duct. The nose section assembly is attached directly to the fwd face of the engine. An engine support frame (saddle), integral with the pylon, carries the main engine mounts as well as the engine steady mounts.

Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC

Each engine nacelle group consists of a pylon, nose section, the upper, lower inbd, and lower outbd access doors, fire seal, aft fairing and engine support structure. The nose section attaches directly to the front face of the engine and guides air to the engine by means of the engine air intake duct mounted internally within the nose section. The remaining intake air is ducted to the aft fan portion of the engine. The three access doors make up the center portion of the nacelle. The upper door and the lower inbd door are hinged at the pylon. The lower outbd door is hinged to the lower edge of the upper door. Each of the access doors have an internal skin attached to longitudinal door frames to provide air passages between the nose section and the engine aft fan housing, The aft fairing is bolted to the fwd frame of the aft fan housing and covers the aft fan section of the engine and the engine tailpipe. The thrust reverser is contained in the aft portion of the aft fairing.

Model NA 265-65

Each nacelle consists of a fixed nose section, upper and lower cowl doors, an aft fairing and the thrust reversers which are attached to the aft fairing. The nose section forms the engine air inlet and is bolted to the fwd face of the engine. The upper and lower cowl doors are hinged to provide easy access to the engine and are easily removed by removing the hinge pins, The upper and lower cowl doors are secured in place by quick acting, over-center type latches. The aft fairing is bolted to the aft face of the engine and helps to direct the fan bypass air around the tailpipe of the engine. The aft portion of the aft fairing supports the thrust reverser assembly and its operating mechanisms.

The pylon is cantilevered from the fuselage and serves as a structural support and fairing for the engine support fittings which extend through the pylon and attach to the fuselage structure. All controls, lines, ducts and electrical wiring associated with the engine are routed through the pylon. The fwd and intermediate sections of the pylon, which are secured to the primary engine support fitting, each contain a sealed firewall to isolate the fuselage structure from the engine. The complete nacelle assembly is cantilevered from the pylon by engine support fittings and structural carry-through fittings that extend inbd through the pylons and attach to the fuselage structure.

NACELLES AND PYLONS REPAIR INDEX

See figures 1 and 3 for Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9). See figures 2 and 4 for Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC. See figure 6 for Model NA 265-65.

NACELLES AND PYLONS NEGLIGIBLE DAMAGE LIMITS

Refer to section 54-00-10 for negligible damage limits.

REPLACING NACELLE DOORS, MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8, AND -9)

Each door is fitted as an individual unit, assuming that all other doors on the nacelle are properly fitted and trimmed.

1. Fitting New Upper Nacelle Door
   - A. With undamaged lower nacelle door removed, place new upper nacelle door in proper location, making certain that all guide pins of upper door are properly engaged in guide pin receptacles, on upper longeron of fire wall assembly.
   - B. Engage latching mechanism, and pull door down, overlapping excess skin of upper nacelle door over existing skin trim of fire wall. As an aid in overlapping skins, insert thin strips of stainless steel between nacelle door and fire wall skins, to guide nacelle skin over fire wall skin.
   - C. Tighten locking latch; mark nacelle door for trim

STRUCTURAL IDENTIFICATION (Continued)

REPLACING NACELLE DOORS, MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8, AND -9) (Cont'd)

D. Trim nacelle door, a little at a time, until skin trims match and nacelle door longeron and fire wall longeron meet at aft end of fire wall.

E. Drill a 1/4 in. hole through fwd edge of nacelle door skin, picking up center Camloc fastener location on engine saddle.

F. Install a 1/4 in. bolt through nacelle door skin and engine saddle, to prevent movement while marking trim on fwd side of door. (Use large-area washers on each side of bolt to prevent damage to door or Camloc receptacle.)

G. Trim fwd edge of nacelle door to match existing skin trim on engine saddle.

H. Lock fwd latch; check upper nacelle door to fire wall trim. Retrim if necessary, to maintain proper gap (0 to 1/16 in.).

I. Reinstall lower nacelle door; engage all latches and retaining hooks. Raise lower door by lapping excessive skin on upper door over skin on lower door and marking for trim.

J. Trim excess skin on top door, a little at a time, until longerons on upper and lower door mate, proper skin gap is maintained, and skin trim on fwd edge of upper nacelle door lies tight against skin land on engine saddle.

K. Pick up Camloc fastener locations on fwd edge of upper nacelle door.

2. Fitting Lower Nacelle Door

A. With fitted upper door in place, hang new lower door on the two inbd hooks and push outbd side up until safety latch is engaged.

B. Engage all latches; pull door up close enough to check skin fit at fwd end. Be careful not to pull door up too tight, as this will damage skin at edges of door.

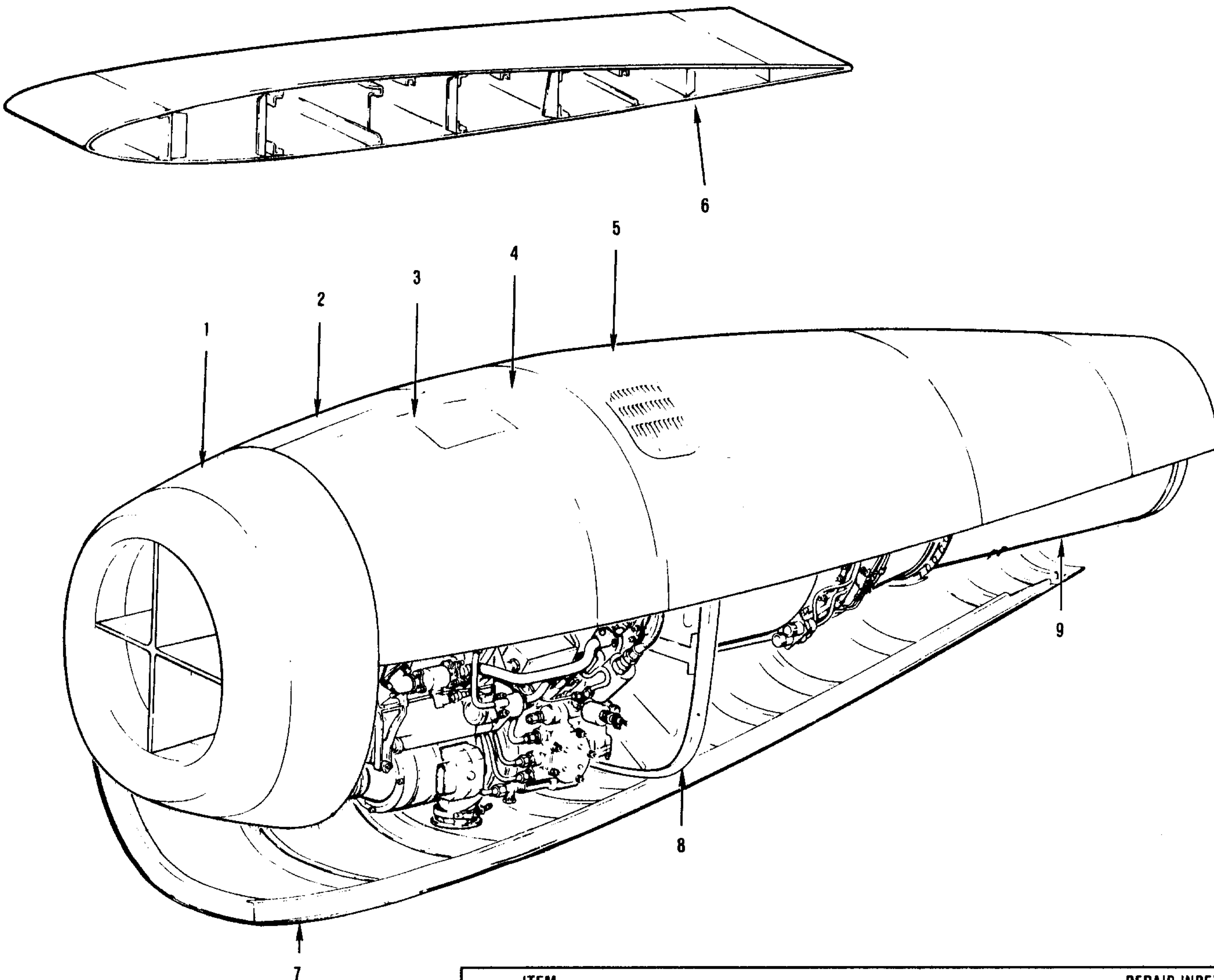
C. Mark and trim skin at fwd end of door to match leading edge skin.

D. Place strip of one in. masking tape along both lower edges of upper door skin.

E. Hold thin strips of stainless steel along lower edges of upper door, so that excess skin on edges of lower door is forced out and over upper door skin as lower door is pulled up and latched into position.

F. Remove stainless-steel guide strips; then place another strip of one in. tape on top of first strip, so that lower edge of tape overlaps lower door skin. Mark door skin along lower edge of tape.

G. Remove tape, lower door, and trim skin along line. Slight additional trimming may be required to maintain skin gap tolerances (0 to 1/16 in. gap).

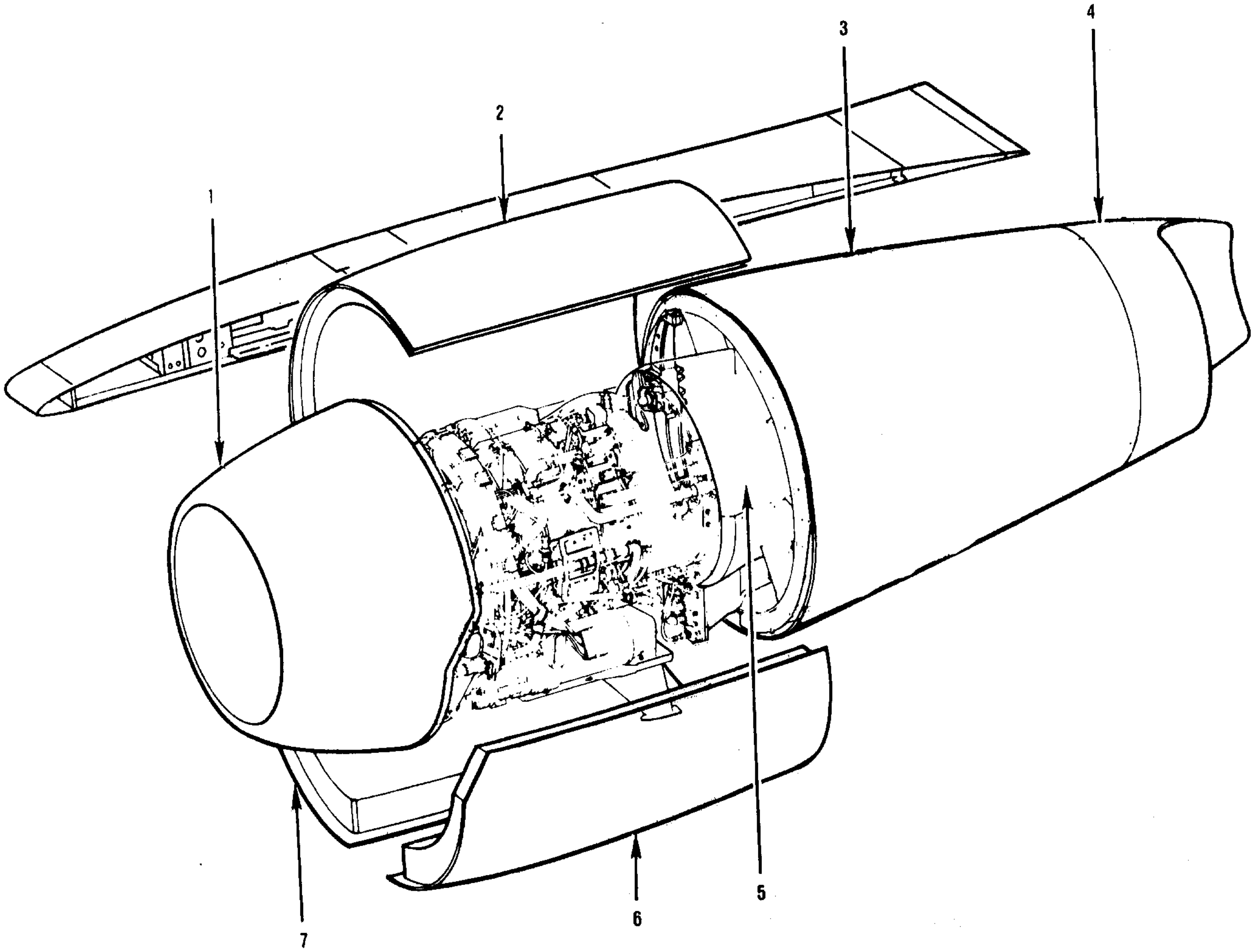


ITEM NO.	NOMENCLATURE	ASSY NO.	REPAIR INDEX FIGURE NO.
1	NOSE ASSY	265-321200	FIGURE 5
2	DOOR ASSY — INBD	265-321345	FIGURE 3
3	DOOR ASSY — OUTBD	265-321349	FIGURE 3
4	BEAM — ENGINE SUPPORT	265-321250	FIGURE 3
5	DOOR ASSY NACELLE — UPPER	265-321340	FIGURE 3
6	PYLON ASSY	265-321244	FIGURE 3
7	DOOR ASSY — NACELLE — LOWER	265-321330	FIGURE 3
8	DIAPHRAGM ASSY	265-420007	FIGURE 5
9	TAIL-PIPE ASSY	265-420003	FIGURE 5

REFER TO SECTION 54-00-10 FOR NEGLIGIBLE DAMAGE LIMITS

S265-3-166

Nacelle and Pylon Master Repair Index —
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 1



ITEM NO.	NOMENCLATURE	ASSY NO.	REPAIR INDEX FIGURE NO.
1	ENGINE AIR INTAKE	234-22022	FIGURE 4
2	UPPER ACCESS DOOR	MY20.551.30	FIGURE 4
3	AFT FAIRING	MY20.551.90	FIGURE 4
4	THRUST REVERSER	234-23000	FIGURE 4
5	INNER FAIRING (FIREWALL)	234-22033	FIGURE 4
6	LOWER OUTBD ACCESS DOOR	MY20.551.50	FIGURE 4
7	LOWER INBD ACCESS DOOR	MY20.551.70	FIGURE 4

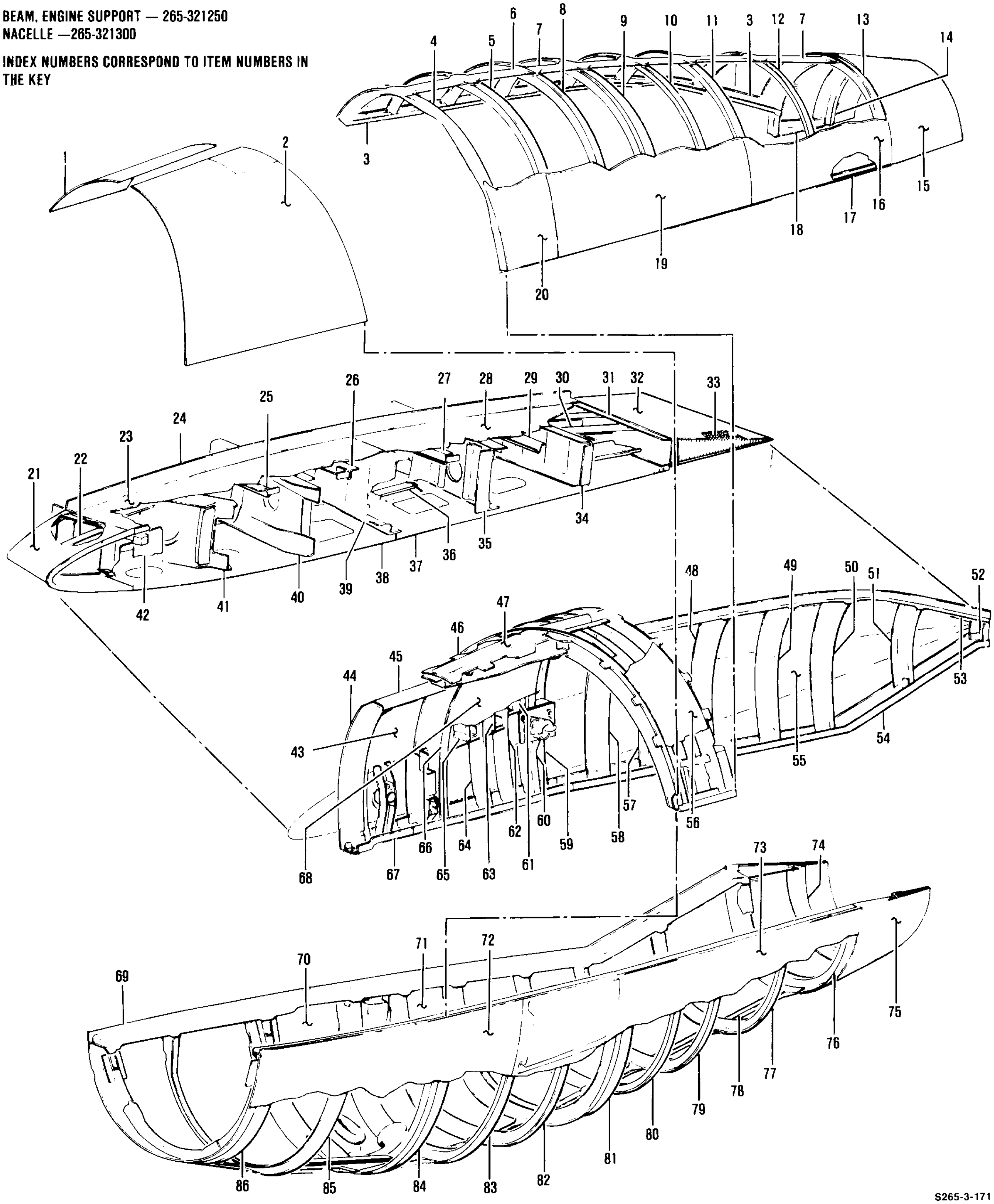
S370-3-29

Engine and Nacelle Master Repair Index —
Model NA 265-70, (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 2

ASSEMBLY DRAWING NUMBERS
PYLON—265-321226

BEAM, ENGINE SUPPORT — 265-321250
NACELLE —265-321300

INDEX NUMBERS CORRESPOND TO ITEM NUMBERS IN THE KEY



Nacelle and Pylon Repair Index —
Model NA 265-40-, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 3

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-321345-11	Door — Nac Sta 72 to 90.305, Inbd	17-7 PH CRES	0.020	54-30-20 Fig. 202
2	265-321349-11	Door — Nac Sta 72 to 90.305, Outbd	17-7PH CRES	0.020	54-30-20 Fig. 202
3	265-321306-21	Longeron — Inbd	17-7PH CRES	0.025	
4	265-321313-12	Frame — Nac Canted Sta 101-3/16	17-7PH CRES	0.032	
5	265-321280-21	Frame — Fire Wall, Nac Sta 108.375	17-7PH CRES	0.025	
6	265-321340-17	Stiffener	7178-T6 Clad	0.032	
7	265-321340-19	Stiffener	17-7PH CRES	0.025	
8	265-321340-13	Frame — Nac Sta 115.719	7178-T6 Clad	0.032	
9	265-321312-51	Frame — Nac Sta 123.0	17-7PH CRES	0.040	
10	265-321340-11	Frame — Nac Sta 130.625	17-7PH CRES	0.025	
11	265-321340-9	Frame — Nac Sta 136.813	17-7PH CRES	0.025	
12	265-321340-7	Frame — Nac Sta 147.312	17-7PH CRES	0.025	
13	265-321340-5	Frame — Nac Sta 158.063	17-7PH CRES	0.025	
14	265-321334	Frame — Nac Canted Sta 163.750	17-7PH CRES	0.040	
15	265-321340-53	Skin — Nac Sta 156.844 to Canted Sta 167.960	17-7PH CRES	0.020	54-30-20 Fig. 202
16	265-321342-5	Skin — Nac Sta 136-3/16 to 156.844	7178-T6 Bare	0.040 A	54-30-20 Fig. 201, 202
17	265-321305-11	Longn — Outbd	17-7PH CRES	0.025	
18	265-321340-21	Longn — Inbd Nac Sta 156.844 to 163-1/2	17-7PH CRES	0.025	
19	265-321342-3	Skin — Nac Sta 107.688 to 136-3/16	7178-T6 Bare	0.040 A	54-30-20 Fig. 201, 202
20	265-321341-3	Skin — Canted Nac Sta 98.9 to Canted Nac	17-7PH CRES	0.020	54-30-20 Fig. 202
21	265-321227-3	Skin — Pylon LE	2024-T4 Clad	0.040	54-30-20 Fig. 202
22	265-321227-5	Rib — Pylon LE	7178-T6 Clad	0.032	
23	265-321228-3	Skin — Pylon, Upper Fwd	7178-T6 Bare	0.050	54-30-20 Fig. 202
24	265-321244-7	Angle — Pylon to Fus	7178-T6 Clad	0.050	
25	265-321244-47	Stiffener	7178-T6 Clad	1S23	
26	265-321244-35	Stiffener	7178-T6 Clad	1S23	
27	265-321244-23	Stiffener	7178-T6 Clad	1S23	
28	265-321352-3	Skin — Pylon, Upper Aft	17-7PH CRES	0.025	54-30-20 Fig. 202
29	265-321244-19	Stiffener	7178-T6 Clad	1S23	
30	265-321244-17	Stiffener	7178-T6 Clad	1S23	
31	265-321243-7	Beam — Pylon TE	7178-T6 Clad	0.032	
32	265-321243-5	Facing Sheet — Pylon TE	2024-T42 Clad	0.012	
33	265-321243-3	Core	5052-H34 Honeycomb	1/4 x 0.001	
34	265-321353	Frame — Pylon, Fus Sta 368	302 CRES	0.025	
35	265-321339	Frame — Pylon, Fus Sta 357	17-7PH CRES	0.032	
36	265-321244-9	Angle — Pylon to Fus	7178-T6 Clad	0.050	
37	265-321351-3	Skin — Pylon Lower Aft	17-7PH CRES	0.025	54-30-20 Fig. 202
38	265-321229-7	Skin — Pylon, Lower Fwd	7178-T6 Bare	0.100	54-30-20 Fig. 202
39	265-321354	Frame — Pylon Fus Sta 344	302 CRES	0.032	
40	265-321239	Support — Pylon, Fus Sta 333.625	7079-T6 Hand Forging		
41	265-321238	Support — Pylon, Fus Canted Sta 318.586	7079-T6 Hand Forging		
42	265-321237	Frame Assy — Fus Sta 307.25			
	265-321-237-5 and -7	Angle	7075-T6 Extr	28554	

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.*

S265-3-171

Key to Figure 3 (Sheet 1 of 3)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
42	265-321237-9	Bulkhead	7075-T6 Bare	0.032	
	265-32137-13	Angle	2024-T4 Clad	0.032	
43	265-321230-5	Skin — Nac Sta 72.062 to 156.781	17-7PH CRES	0.040 A	
44	265-321226-21	Hat — Nac Sta 74	17-7PH CRES	0.040	
45	265-321231	Longn — Nac Sta 74-3/4 to Canted Sta 90.034	17-7PH CRES	0.025	
46	265-321259-11	Beam — Eng Spt	17-7PH CRES	0.050	54-40-20 Fig. 201
47	265-321252-5	Skin — Outer Beam Assy	17-7PH CRES	0.050 A	
48	265-321226-11	Hat — Nac Sta 122.687	17-7PH CRES	0.040	
49	265-321226-9	Zee — Nac Sta 130.625	17-7PH CRES	0.025	
50	265-321226-7	Zee — Nac Sta 137.437	17-7PH CRES	0.025	
51	265-321226-5	Zee — Nac Sta 147.312	17-7PH CRES	0.025	
52	265-321226-3	Channel — Nac Sta 157.125	17-7PH CRES	0.025	
53	265-321233-11	Longn — Upper, Nac Canted Sta 98.9 to 157-1/8	17-7PH CRES	0.025	
54	265-321234	Longn — Lower, Nac Sta 104 to 157-1/8	17-7PH CRES	0.020	
55	265-321230-7	Skin — Nac Sta 72.062 to 156.781	17-7PH CRES	0.040 A	
56	265-321252-3	Skin — Outer, Eng Spt Beam	17-7PH CRES	0.050 A	
57	265-321226-13	Hat — Nac Sta 115.50	7178-T6 Bare	0.040	
58	265-321226-19	Zee — Nac Sta 108.375	17-7PH CRES	0.032	
59	265-321251-3	Angle — Nac Sta 102	17-7PH CRES	0.040	
60	265-321313-5	Frame — Nac Canted Sta 101-3/16	17-7PH CRES	0.032	
61	265-321263-5	Frame — Nac Canted Sta 98.897	17-7PH CRES	0.050 A	
62	265-321254	Frame Assy — Nac Canted Sta 96.894			
	265-321254-3	Frame	7178-T6 Bare	0.050	
	265-321254-5	Frame	7178-T6 Bare	0.040	
63	265-321255	Frame Assy — Nac Canted Sta 94.892			
	265-321255-3	Frame	7178-T6 Bare	0.050	
	265-321255-5	Frame	7178-T6 Bare	0.040	
64	265-321256	Frame Assy — Nac Canted Sta 92.889			
	265-321256-3	Frame	7178-T6 Bare	0.050	
	265-321256-5	Frame	7178-T6 Bare	0.040	
65	265-321258	Frame — Nac Canted Sta 88.884	7178-T6 Bare	0.050	
66	265-321264-5	Frame — Nac Canted Sta 90.304	17-7PH CRES	0.050 A	
67	265-321232	Longn — Nac Sta 72-7/8 to 82-3/16	17-7PH CRES	0.032	
68	265-321253	Skin — Inner, Eng Spt Beam	17-7PH CRES	0.050	
69	265-321277	Longn — Inbd, Nac Sta 72 to 164	17-7PH CRES	0.025	
70	265-321331-3	Skin — Inbd Fwd	17-7PH CRES	0.020	54-30-20 Fig. 202
71	265-321331-5	Skin — Inbd Aft	17-7PH CRES	0.020	54-30-20 Fig. 202
72	265-321332-3	Skin — Outbd Fwd	7178-T6 Clad	0.040 A	54-30-20 Fig. 201
73	265-321332-5	Skin — Outbd Aft	7178-T6 Clad	0.040 A	54-30-20 Fig. 201
74	265-321334-21	Frame — Nac Sta 163.750	17-7PH CRES	0.020	

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.***

S285-3-171

Key to Figure 3 (Sheet 2 of 3)

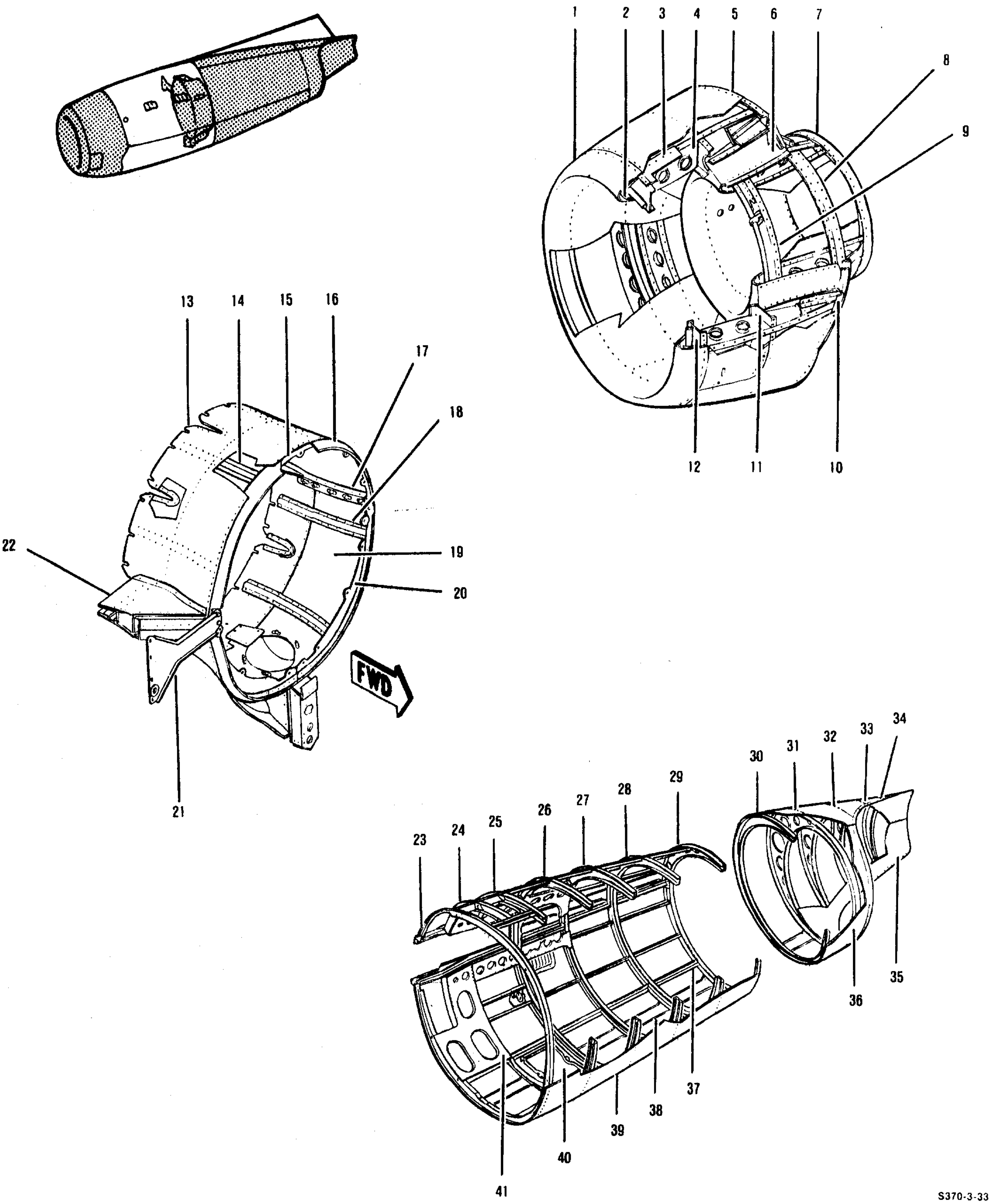
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
75	265-321330-83	Skin — Aft	17-7PH CRES	0.02	54-30-20 Fig. 202
76	265-321333-81	Frame — Nac Sta 157.750	17-7PH CRES	0.032	
77	265-321292-41				
78	265-321330-9 -15, and -75	Splice — Nac Skin	17-7PH CRES	0.020	
79	265-321292-61	Frame — Nac Sta 137.437	17-7PH CRES	0.020	
80	265-321292-51	Frame — Nac Sta 130.625	17-7PH CRES	0.020	
81	265-321333-61	Frame — Nac Sta 122.688	17-7PH CRES	0.050	
82	265-321292-31	Frame — Nac Sta 115.063	7075-T6 Clad	0.040	
83	265-321280-11	Frame — Nac Sta 108.375	17-7PH CRES	0.025	
84	265-321333-51	Frame — Nac Sta 96.750	17-7PH CRES	0.040	
85	265-321292-23	Frame — Nac Sta 84.969	7075-T6 Clad	0.025	
86	265-321333-11	Frame — Nac Sta 74	17-7PH CRES	0.032	

NOTE

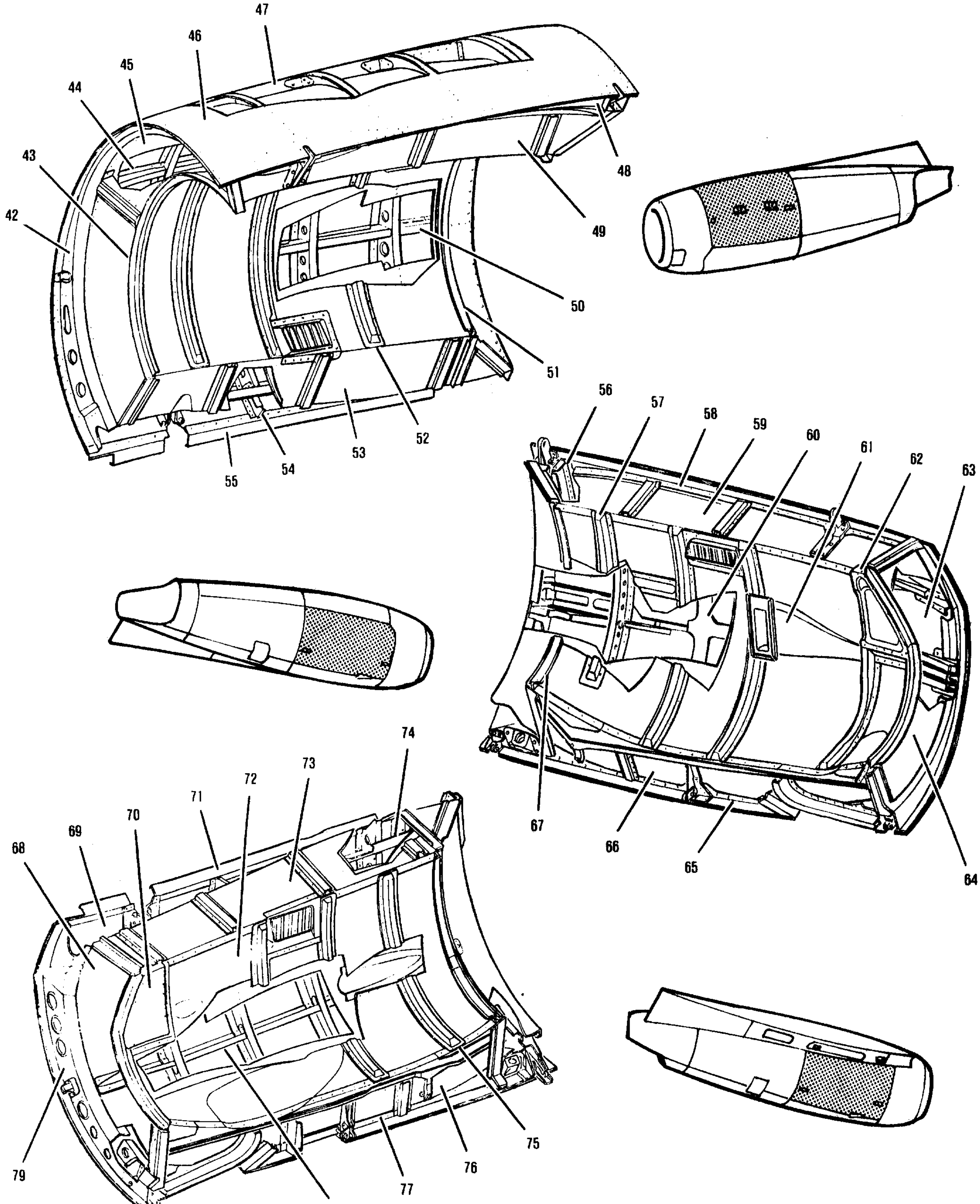
- *For additional repairs, refer to 51-70-00.*

S265-3-171

Key to Figure 3 (Sheet 3 of 3)



Nacelle Repair Index — Model NA 265-70
(S/N 370-1 and -7), -80, -80A, and -80SC
Figure 4 (Sheet 1 of 2)



Nacelle Repair Index — Model NA 265-70
(S/N 370-1 and -7), -80, -80A, and -80SC
Figure 4 (Sheet 2 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.
1	Leading Edge — Outer Skin	5052-0 Bare	0.065
2	Leading Edge — Inner Skin	5052-0 Bare	0.025
3	Finger Strips	2017-T4 Clad	0.051
4	Nose Section Ribs (Typ)	2017-T4 Clad	0.040
5	Nose Section Outer Skin	2017-T4 Clad	0.032
6	Nacelle Struts	2017-T4 Clad	0.040
7	Air Intake Frame No. 6	2017-T4 Bare	0.051
8	Air Intake Frame No. 5	2017-T4 Clad	0.051
9	Air Intake Frame No. 3	2017-T4 Clad	0.032
10	Air Intake Frame No. 4	2017-T4 Clad	0.040
11	Air Intake Frame No. 2	2017-T4 Clad	0.025
12	Air Intake Frame No. 1	2017-T4 Clad	0.032
13	Inner Fairing Upper Skin	Titanium	0.025
14	Upper Stiffener (Typ)	Titanium	0.025
15	Upper Frame Web	Titanium	0.032
16	Sealing Strip	Titanium	0.025
17	Splice Plate	Titanium	0.025
18	Lower Stiffener (Typ)	Titanium	0.025
19	Inner Fairing Lower Skin	Titanium	0.025
20	Lower Frame Web	Titanium	0.025
21	Transverse Attach Plate	Titanium	0.025
22	Inner Fairing Strut Skin	2017-T4 Clad	0.032
23	Aft Fairing Frame No. 1	2017-T4 Clad	0.032
24	Aft Fairing Frame No. 2	2017-T4 Clad	0.032
25	Aft Fairing Frame No. 3	2017-T4 Clad	0.032
26	Aft Fairing Frame No. 4	2017-T4 Clad	0.032
27	Aft Fairing Frame No. 5	2017-T4 Clad	0.025
28	Aft Fairing Frame No. 6	2017-T4 Clad	0.025
29	Aft Fairing Frame No. 7	2017-T4 Clad	0.025
30	Translating Structure Frame No. 1	2024-T42 Bare	0.032
31	Translating Structure Frame No. 2	2017-T4 Clad	0.032
32	Translating Structure Frame No. 3	2017-T4 Clad	0.032
33	Translating Structure Frame No. 4	2017-T4 Clad	0.032
34	Translating Structure Frame No. 5	2017-T4 Clad	0.032
35	Translating Structure Inner Skin	Titanium	0.020
36	Translating Structure Outer Skin	2017-T4 Clad	0.025
37	Aft Fairing Stringers (Typ)	2017-T4 Clad	0.032
38	Skin Splice Stiffeners	2017-T4 Clad	0.032
39	Aft Fairing Skins	2017-T4 Clad	0.025
40	Lower Access Door	2024-T3	0.081
41	Support Skins	2017-T4 Clad	0.016
42	Upper Door — Fwd Frame	2017-T4 Clad	0.050
43	Inner Skin Stiffening Angle	2017-T4 Clad	0.050
44	Longitudinal Stringer (Centerline)	2017-T4 Clad	0.032
45	Fan Duct Skin	2017-T4 Clad	0.032
46	Upper Door Outer Skin	2017-T4 Clad	0.025

NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 4 (Sheet 1 of 2)

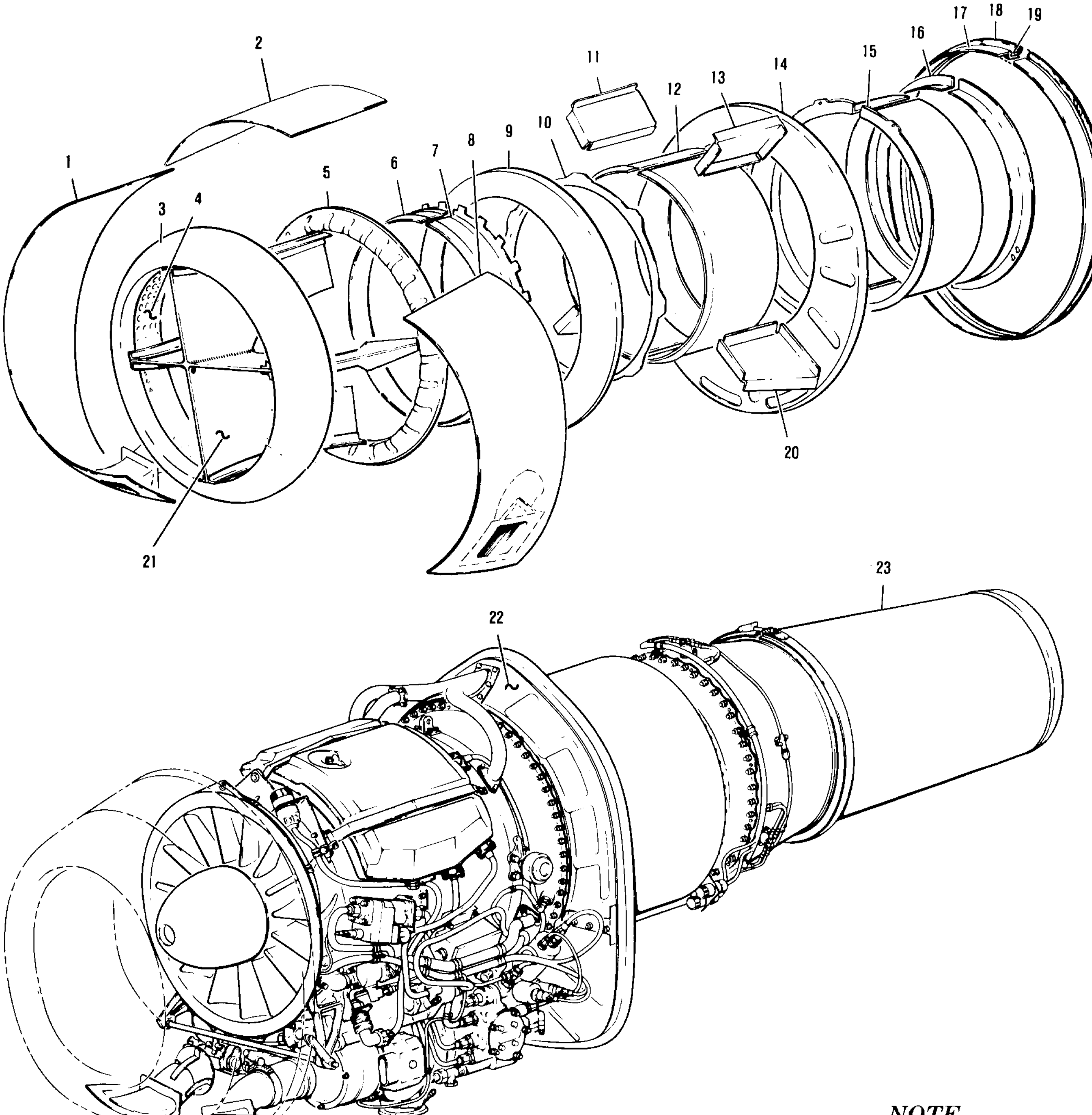
STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.
47	Longitudinal Stringer (Outbd)	2017-T4 Clad	0.025
48	Stiffener	2017-T4 Clad	0.040
49	Outer Half Strut	2017-T4 Clad	0.040
50	Longitudinal Stringer (Inbd)	2017-T4 Clad	0.025
51	Upper Door — Aft Frame	2017-T4 Clad	0.050
52	Hat Section Inner Skin Stiffeners (Typ)	2017-T4 Clad	0.032
53	Inner Half Strut	2017-T4 Clad	0.040
54	False Rib	2017-T4 Clad	0.050
55	Pylon Mating Strips	2017-T4 Clad	0.025
56	Hinge Frame	2017-T4 Clad	0.051
57	Hat Section Inner Skin Stiffeners (Typ)	2017-T4 Clad	0.032
58	Half Strut Attach Angle	2017-T4 Clad	0.040
59	Half Strut — Upper	2017-T4 Clad	0.040
60	Outer Skin Stiffener	2017-T4 Clad	0.070
61	Air Duct	5052-0 Bare	0.040
62	Doubler	2017-T4 Clad	0.032
63	Outer Door — Outer Skin	2017-T4 Clad	0.032
64	Fan Duct Skin	2017-T4 Clad	0.032
65	Half Strut Attach Angle	2017-T4 Clad	0.040
66	Half Strut — Lower	2017-T4 Clad	0.040
67	Seal Retainer	2017-T4 Clad	0.025
68	Inner Door Fan Duct Skin	2017-T4 Clad	0.032
69	Inner Door — Outer Skin	2017-T4 Clad	0.025
70	Doubler	2017-T4 Clad	0.032
71	Pylon Mating Strips	2017-T4 Clad	0.025
72	Inner Skin	2017-T4 Clad	0.040
73	Half Strut — Upper	2017-T4 Clad	0.040
74	Closeout Skin	2017-T4 Clad	0.040
75	Hat Section Inner Skin Stiffeners (Typ)	2017-T4 Clad	0.032
76	Half Strut — Lower	2017-T4 Clad	0.040
77	Half Strut Attaching Angle	2017-T4 Clad	0.040
78	Longitudinal Stringer	2017-T4 Clad	0.025
79	Inner Door Fwd Frame	2017-T4 Clad	0.050

NOTE

For additional repairs refer to 51-70-00.

Key to Figure 4 (Sheet 2 of 2)



NOTE

ASSEMBLY DRAWING NUMBERS
ENGINE — 265-400001
NOSE ASSEMBLY — 265-321200

S265-3-172

Engine Air Intake, Diaphragm and Tail-pipe Repair Index — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 5

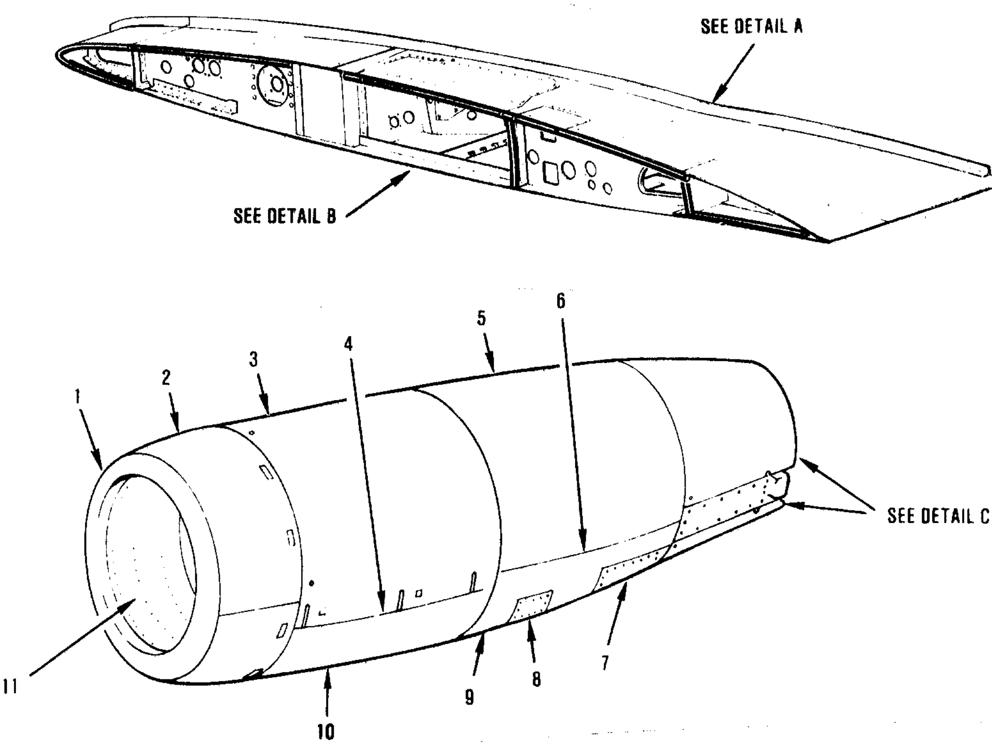
STRUCTURAL IDENTIFICATION (Continued)

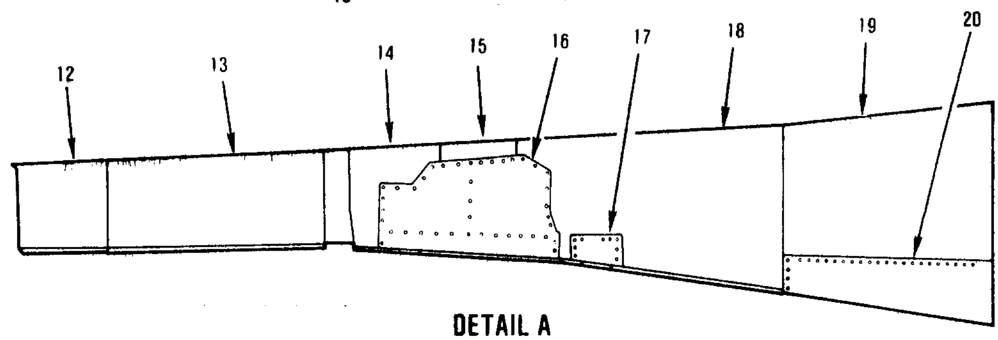
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-321202-2	Skin — Nacelle Inbd	2024-T42 Bare	0.040	54-30-20 Fig. 202
2	265-321201	Skin — Nacelle Upper	2024-T42 Bare	0.063	54-30-20 Fig. 202
3	265-321200-3	Skin — Leading Edge Air Intake	6061-T6 Bare	0.040	
4	265-321200-7	Skin — Perforated Inner	6061-T6 Bare	0.040	
5	265-321200-5	Bulkhead — Leading Edge	6061-T6 Bare	0.040	
6	265-321200-9	Skin — Leading Edge Inner	2024-T42 Clad	0.020	
7	265-321200-13	Skin — Leading Edge Inner	2024-T42 Clad	0.020	
8	265-321202-1	Skin — Nacelle Outbd	2024-T42 Bare	0.040	54-30-20 Fig. 202
9	265-321200-17	Bulkhead	2024-T42 Clad	0.025	
10	265-321200-19	Angle	2024-T42 Clad	0.025	
11	265-321200-29	Intercoastal	2024-T42 Clad	0.020	
12	265-321200-15	Skin — Engine Air Intake Inner	2024-T42 Clad	0.040	
13	265-321200-27	Intercoastal	2024-T42 Clad	0.020	
14	265-321200-59	Bulkhead	Type 321 CRES	0.020	
15	265-321200-63	Skin — Engine Air Intake Inner	Type 321 CRES	0.020	
16	265-321200-67	Angle — Engine Attach	Type 321 CRES	0.020	
17	265-321200-75	Seal Support	Type 301 1/2H CRES	0.016	
18	5353	Seal			
19	265-321200-73	Seal Support	Type 301 1/2H CRES	0.016	
20	265-321200-25	Intercoastal	2024-T42 Clad	0.040	
21	265-321205	Vane Assy	6061-T6 Bare	0.125	54-30-20 Fig. 201
22	265-420007	Diaphragm Assy — Engine			
	265-420007-9	Diaphragm Section	Type 321 CRES	0.025	
	265-420007-10	Diaphragm Section	Type 321 CRES	0.025	
	265-420007-11	Diaphragm Section	Type 321 CRES	0.025	
23	265-420003	Tail-pipe Assy — Engine			
	265-420003-13	Pipe	Type 321 CRES	0.025	
	265-420003-7	Doubler	Type 321 CRES	0.040	
	265-420004-3	Flange	Type 321 CRES Bar	0.8125	
	265-420004-7	Sheet	Type 321 CRES	0.025	

NOTE

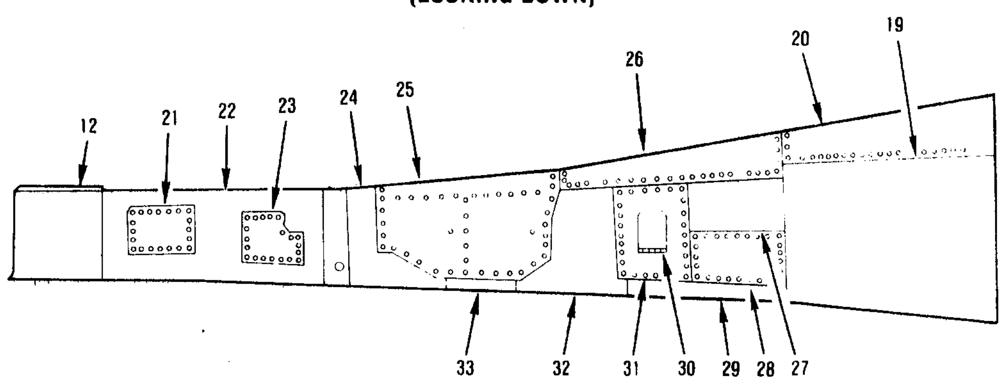
For additional repairs, refer to 51-70-00.

Key to Figure 5



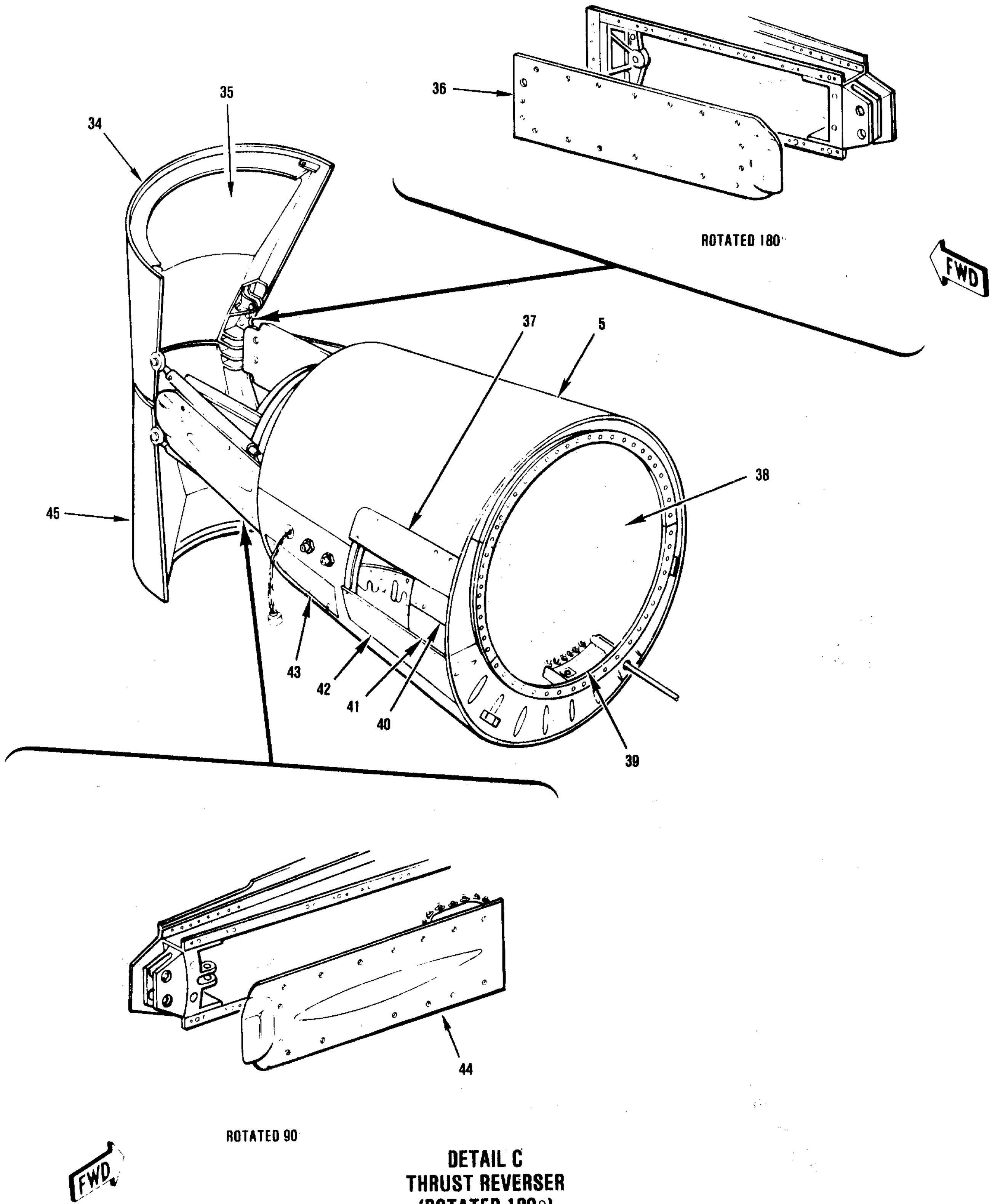


DETAIL A
PYLON
(LOOKING DOWN)



DETAIL B
PYLON
(LOOKING UP)

Nacelle and Pylon Repair Index — Model NA 265-65
Figure 6
(Sheet 1 of 2)



DETAIL C
THRUST REVERSER
(ROTATED 180°)

Nacelle and Pylon Repair Index — Model NA 265-65
Figure 6
(Sheet 2 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.		DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.
1	F10A5B20040-11		Skin, Nose Cowl, Nac Sta 3.2 to 6.8, LH	302/321	0.050
	F10A5B20040-12		Skin, Nose Cowl, Nac Sta 3.2 to 6.8, RH	302/321	0.050
2	F10A5B20241-15	A	Skin, Nose Cowl, Nac Sta 5.41 to 19.6, LH	2024-T6 COS	0.050
	F10A5B20241-17	A	Skin, Nose Cowl, Nac Sta 5.41 to 19.6, RH	2024-T6 COS	0.050
3	F10A5B10300-105	A	Skin, Upper Cowl, LH	2024-T6 COS	0.063
	F10A5B10300-107	A	Skin, Upper Cowl, RH	2024-T6 COS	0.063
4	F10A5B10320-105	A	Skin, Lower Cowl Door LH	2024-T6 COS	0.063
	F10A5B10320-107	A	Skin, Lower Cowl Door, RH	2024-T6 COS	0.063
5	F10A5B20271-15		Skin, Aft Cowl, Upper, Ext. LH	2024-T6 COS	0.025
	F10A5B20271-17		Skin, Aft Cowl, Upper, Ext, RH	2024-T6 COS	0.025
6	F10A5B20271-11		Skin, Aft Cowl, Lower Ext. LH	2024-T6 COS	0.025
	F10A5B20271-13		Skin, Aft Cowl, Lower Ext, RH	2024-T6 COS	0.025
7	F10A5B20284-31		Cover, Aft Cowl, Ext, LH	2024 OC	0.050
	F10A5B20284-32		Cover, Aft Cowl, Ext, RH	2024 OC	0.050
8	F10A5B20284-25		Cover, Aft Cowl, Ext, LH	2024-T3 C	0.050
	F10A5B20284-26		Cover, Aft Cowl, Ext, RH	2024-T3 C	0.050
9	F10A5B20284-43		Cover, Aft Cowl, Ext	2024-T3 C	0.050
10	F10A5B20241-11	A	Skin, Nose Cowl, Nac Sta 5.41 to 19.6, LH	2024-T6 COS	0.050
	F10A5B20241-13	A	Skin, Nose Cowl, Nac Sta 5.41 to 19.6 RH	2024-T6 COS	0.050
11	F10A5B20242-1	B	Skin, Inlet, Nac Sta 6.13 to 28.27, LH	2219-T6	0.050
	F10A5B20242-2	B	Skin, Inlet, Nac Sta 6.13 to 28.27, RH	2219-T6	0.050
12	465-320151-011		Skin, Leading Edge, LH	2024-T42 Clad	0.040
	465-320151-012		Skin, Leading Edge, RH	2024-T42 Clad	0.040
13	465-320159-001		Skin, Upper, Sta 307.25 to 331.33, LH	2024-T42 Clad	0.050
	465-320159-002		Skin, Upper, Sta 307.25 to 331.33, RH	2024-T42 Clad	0.050
14	465-320142-003		Skin, Upper, Sta 334.31 to 381.44	301 CRES	0.050
15	465-320142-005		Skin, Upper, Sta 342.21 to 352.83	301 CRES	0.050
16	465-320104-003		Door, Upper, Sta 336.38 to 357.39, LH	301 CRES	0.050
	465-320104-004		Door, Upper, Sta 336.38 to 357.39, RH	301 CRES	0.050
17	465-320116-003		Door, Access, LH	301 CRES	0.050
	465-320116-004		Door, Access, RH	301 CRES	0.050
18	465-320142-007		Skin, Upper, Sta 334.33 to 381.44, LH	301 CRES	0.050
	465-320142-008		Skin, Upper, Sta 334.33 to 381.44, RH	301 CRES	0.050
19	465-320103-011		Skin, Pylon, Sta 381.53 to 405.75, LH	2024-T42 Clad	0.040
	465-320103-012		Skin, Pylon, Sta 381.53 to 405.75, RH	2024-T42 Clad	0.040
20	465-320103-021		Door Assy, Sta 381.44 to 405.75, LH	2024-T42 Clad	0.040
	465-320103-022		Door Assy, Sta 381.44 to 405.75, RH	2024-T42 Clad	0.040
21	465-320155-001		Door, Lower, Sta 309.66 to 317.38	2024-T42 Clad	0.050
22	465-320160-001		Skin, Lower, Sta 307.25 to 331.33, LH	2024-T42 Clad	0.050
	465-320160-002		Skin, Lower, Sta 307.25 to 331.33, RH	2024-T42 Clad	0.050
23	465-320156-003		Door, Lower, Sta 321.48 to 329.61, LH	2024-T42 Clad	0.050
	465-320156-004		Door, Lower, Sta 321.48 to 329.61, RH	2024-T42 Clad	0.050
24	465-320143-003		Skin, Lower, Sta 334.56 to 381.44	301 CRES	0.050
25	465-320105-003		Skin, Lower, Sta 337.44 to 357.44, LH	301 CRES	0.050
	465-320105-004		Skin, Lower, Sta 337.44 to 357.44, RH	301 CRES	0.050
26	465-320132-001		Door, Access LH	301 CRES	0.050
	465-320132-002		Door, Access RH	301 CRES	0.050
27	465-320143-007		Skin, Lower Sta 334.56 to 381.44, LH	301 CRES	0.050
	465-320143-008		Skin, Lower, Sta 334.56 to 381.44, RH	301 CRES	0.050
28	465-320111-003		Door, Lower, Sta 371.00 to 381.44, LH	301 CRES	0.050
	465-320111-004		Door, Lower, Sta 371.00 to 381.44, RH	301 CRES	0.050
29	465-320143-013		Skin, Lower Sta 334.56 to 381.44, LH	301 CRES	0.050
30	465-320110-021		Door, Lower	301 CRES	0.025

NOTES

A This is a chem-milled part. Measure thinned areas for thickness. Take care when repairing.

B Repair using only solid rivets in inner barrel due to potential engine ingestion and subsequent damage.

Key to Figure 6 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.		DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.
31	465-320110-031		Door, Lower, Sta 363.56 to 371.00, LH	301 CRES	0.050
	465-320110-032		Door, Lower, Sta 363.56 to 371.00, RH	301 CRES	0.050
32	465-320143-005		Skin, Lower, Sta 334.56 to 381.44, LH	301 CRES	0.050
	465-320143-006		Skin, Lower, Sta 334.56 to 381.44, RH	301 CRES	0.050
33	465-320143-009		Skin, Lower, Sta 334.56 to 381.44	301 CRES	0.050
34	C41B30213-3		Door, Upper, Thrust Reverser	2024-T6 COS	0.125
	C41B30213-7		Door, Lower, Thrust Reverser	2024-T6 COS	0.125
35	C41B30297-37		Thrust Reverser Inner Skin, Upper	A286HT	0.020
	C41B30297-39		Thrust Reverser Inner Skin, Lower	A286HT	0.036
36	F10A5B20290-41	C	Cover, Aft Nacelle, Sta 252.00 to 274.00, LH	A286HT	0.050
	F10A5B20290-42	C	Cover, Aft Nacelle, Sta 252.00 to 274.00, RH	A286HT	0.050
	F10A5B20290-49	D	Cover, Aft Nacelle, Sta 252.00 to 274.00, LH	A286HT	0.050
	F10A5B20290-50	D	Cover, Aft Nacelle, Sta 252.00 to 274.00, RH	A286HT	0.050
37	F10A5B20284-47		Cover, Aft Cowl, Ext, LH	2024 OC	0.050
	F10A5B20284-48		Cover, Aft Cowl, Ext, RH	2024 OC	0.050
38	F10A5B20272-3		Skin, Fan Duct, Outer, LH	2219-T6	0.032
	F10A5B20272-4		Skin, Fan Duct, Outer, RH	2219-T6	0.032
39	F10A5B20272-7		Door, Access, Engine Ingitor, LH	2024 OC	0.071
	F10A5B20272-8		Door, Access, Engine Ingitor, RH	2024 OC	0.071
40	F10A5B20284-49		Shield, Aft Cowl, Ext, LH	321	0.032
			Shield, Aft Cowl, Ext, RH	321	0.032
41	F10A5B20284-51		Shield, Aft Cowl, Ext, LH	321	0.032
	F10A5B20284-52		Shield, Aft Cowl, Ext, RH	321	0.032
42	F10A5B20284-45		Cover, Aft Cowl, LH	2024 OC	0.050
	F10A5B20284-46		Cover, Aft Cowl, RH	2024 OC	0.050
43	F10A5B20288-13		Cover, Aft Nacelle, LH	2024 OC	0.050
	F10A5B20288-14		Cover, Aft Nacelle, RH	2024 OC	0.050
44	F10A5B20290-43		Cover, Aft Nacelle, Sta 252.00 to 274.00	A286HT	0.050

NOTES

C Use with Grumman Kit 1-24.

D Use with Grumman Kit 24 and Subs.

Key to Figure 6 (Sheet 2 of 2)

NACELLES AND PYLONS

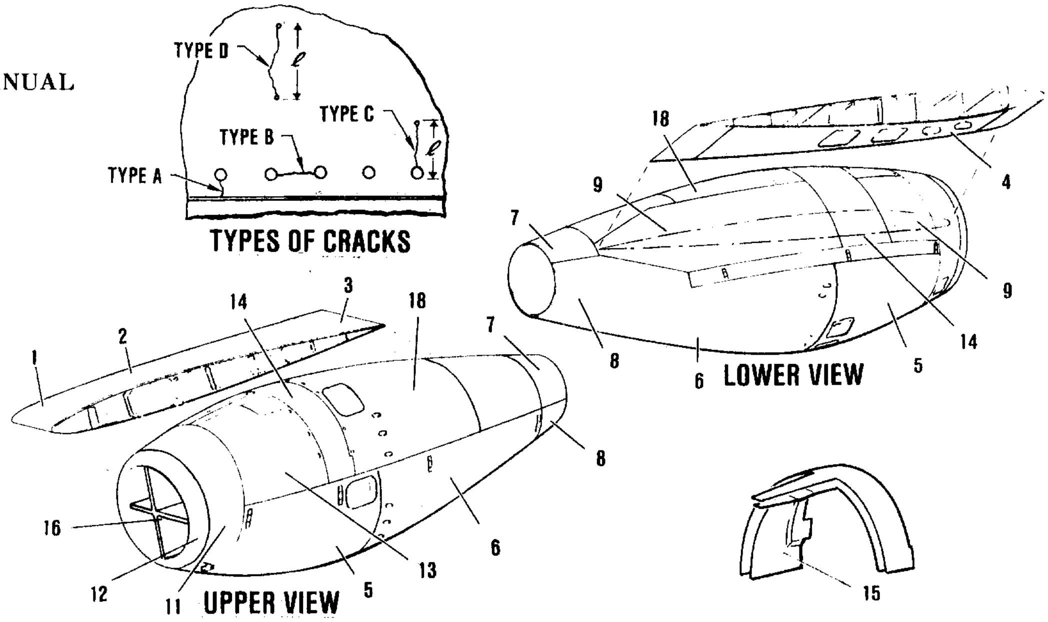
NEGLIGIBLE DAMAGE LIMITS
ALLOWABLE DAMAGE

GENERAL

This section contains negligible damage limits for the nacelles and pylons.

NEGLIGIBLE DAMAGE LIMITS

See figure 101 for Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9) and see figure 102 for Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC.



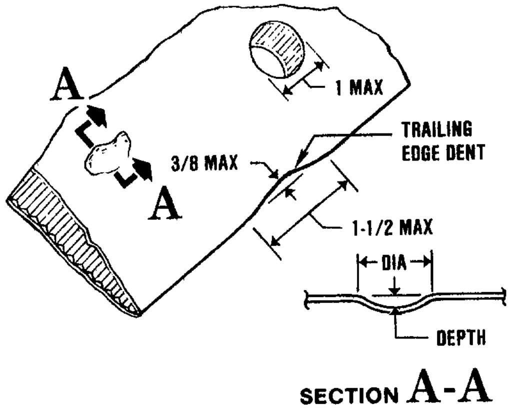
CRACKS — PYLON & NACELLE				
PANEL NO.	TYPE A	TYPE B	TYPE C	TYPE D
1	1 (MAX) IN ANY ONE ROW OF RIVETS	1 (MAX) IN ANY ONE ROW OF RIVETS	1 (MAX) IN ANY ONE ROW OF RIVETS	ℓ= 1 IN. (3 CRACKS MAX) RIVETS
2	NONE FROM STA 307 TO 357 IN FUSELAGE TO PYLON AND PYLON TO NACELLE ATTACH ANGLE. 1 WITH 4 GOOD HOLES EACH SIDE IN REMAINING AREAS.	NONE FROM STA 307 TO 357 ATTACH ANGLES. 1 WITH 6 GOOD HOLES EACH SIDE IN REMAINING AREAS	NONE FROM STA 307 TO 357.1 WITH 4 GOOD HOLES EACH SIDE IN REMAINING AREAS	ℓ= 1 IN. 1 CRACK MAX PER ANY ONE BAY
3	HONEYCOMB	HONEYCOMB	HONEYCOMB	HONEYCOMB
4	NONE FROM STA 307 TO 357 IN FUSELAGE TO PYLON AND PYLON TO NACELLE ATTACH ANGLES. 1 WITH 4 GOOD HOLES EACH SIDE OF DAMAGE	NONE FROM STA 307 TO 357 ATTACH ANGLES. 1 WITH 6 GOOD HOLES EACH SIDE IN REMAINING AREAS	NONE FROM STA 307 TO 357.1 WITH 4 GOOD HOLES EACH SIDE IN REMAINING AREAS.	ℓ= 1 IN. 1 CRACK MAX PER ANY ONE BAY
5	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ= 1 IN.
6	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ= 1 IN.
7	1 WITH 6 GOOD HOLES EACH SIDE OF DAMGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ= 1 IN.
8	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOELS EACH SIDE OF DAMAGE	ℓ= 1 IN.
9	NONE	NONE	NONE	NONE
10	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ= 1 IN.
11	1 WITH 4 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ= 1 IN.
12	1 WITH 4 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ= 1 IN.
13	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES FOR EACH SIDE OF DAMAGE	ℓ= 1 IN.
14	NONE	NONE	NONE	NONE
15	NONE	NONE	NONE	NONE
16	NONE	NONE	NONE	NONE

NOTE

STOP-DRILL ALL CRACKS WITH A NO. 40 (0.098 IN.) DRILL.

9265-3-167

Negligible Damage — Nacelle and Pylon —
Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 101 (Sheet 1 of 3)



HONEYCOMB DENTS

DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS
1	0.030	3 IN.
2	0.050	4 IN.
3	0.070	5 IN.

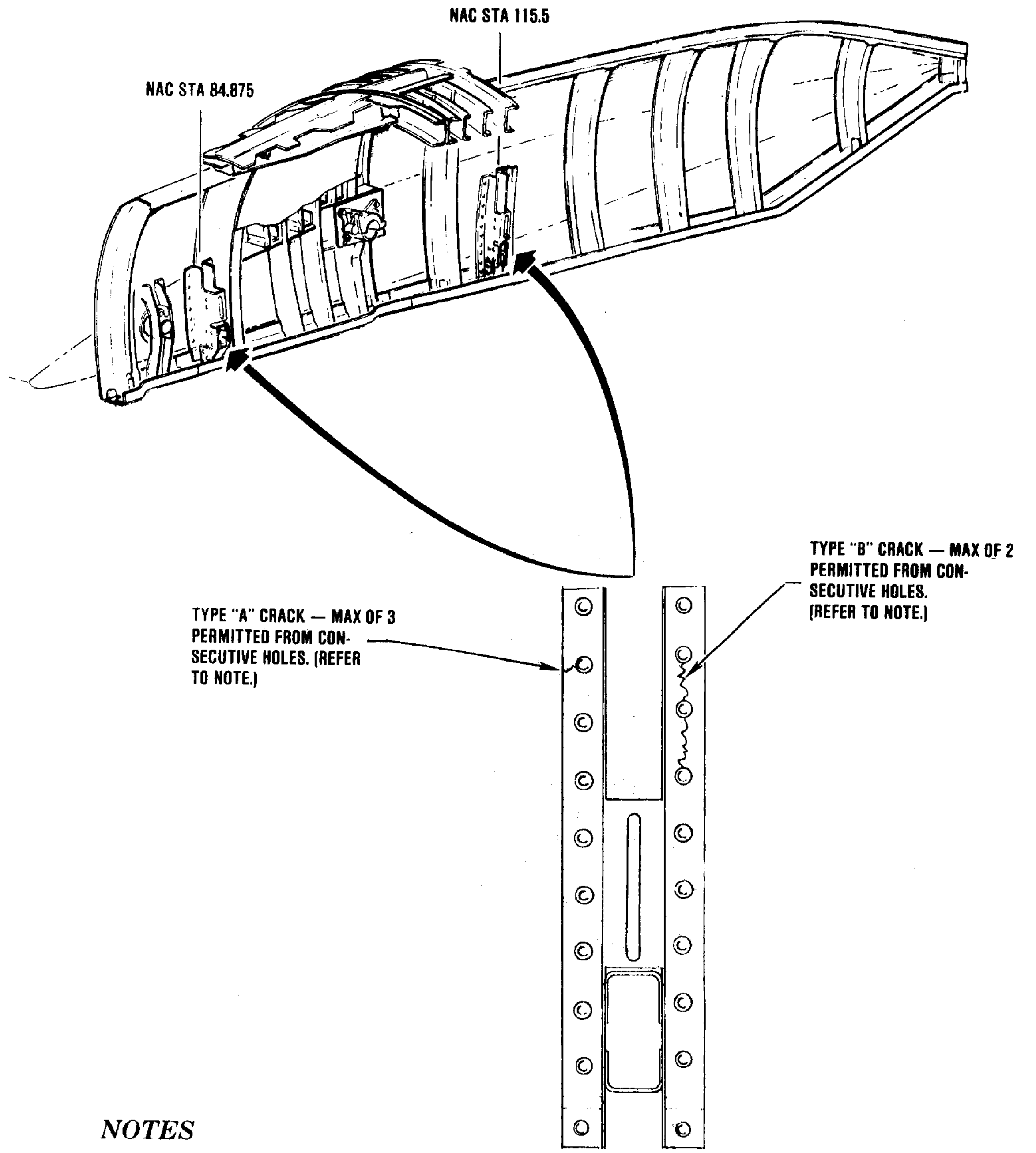
PYLON AND NACELLE								
	SCRATCHES				DENTS			
	CIRCUMFERENTIAL		LONGITUDINAL		1/2 DIA	1 DIA	2 DIA	3 AND OVER
PANEL NO.	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	DEPTH IN IN.	DEPTH IN IN.	DEPTH IN IN.
1	0.006	4	0.006	8	1/16	1/8	5/32	3/16
2	20% SKIN THICKNESS	3	20% SKIN THICKNESS	5	1/16	1/8	5/32	3/16
3	0.002	UNLIMITED	0.002	UNLIMITED	1/32	3/64	1/16	5/64
	0.004	2	0.004	4				
4	20% SKIN THICKNESS	3	20% SKIN THICKNESS	5	1/16	1/8	5/32	3/16
5	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
6	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
7	30% SKIN THICKNESS	4	30% SKIN THICKNESS	11	1/16	1/8	5/32	3/16
8	30% SKIN THICKNESS	4	30% SKIN THICKNESS	11	1/16	1/8	5/32	3/16
9	20% SKIN THICKNESS	4	20% SKIN THICKNESS	4	1/32	1/16	3/32	1/8
10	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
11	20% SKIN THICKNESS	2	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
12	20% SKIN THICKNESS	2	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
13	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
14	15% SKIN THICKNESS	4	15% SKIN THICKNESS	4	1/64	1/32	5/64	1/8
15	15% SKIN THICKNESS	4	15% SKIN THICKNESS	4	1/64	1/32	5/64	1/8
16	25% SKIN THICKNESS	4	25% SKIN THICKNESS	6	1/64	1/32	5/64	1/8

S265-3-168

NOTE

BEFORE ANY DAMAGE CAN BE CONSIDERED NEGLIGIBLE, THE AREA MUST BE TESTED FOR DELAMINATION. DIMENSIONS SHOWN FOR TRAILING EDGE DENTS ARE TYPICAL FOR ALL TRAILING EDGES. ALL HOLES MUST BE PLUGGED.

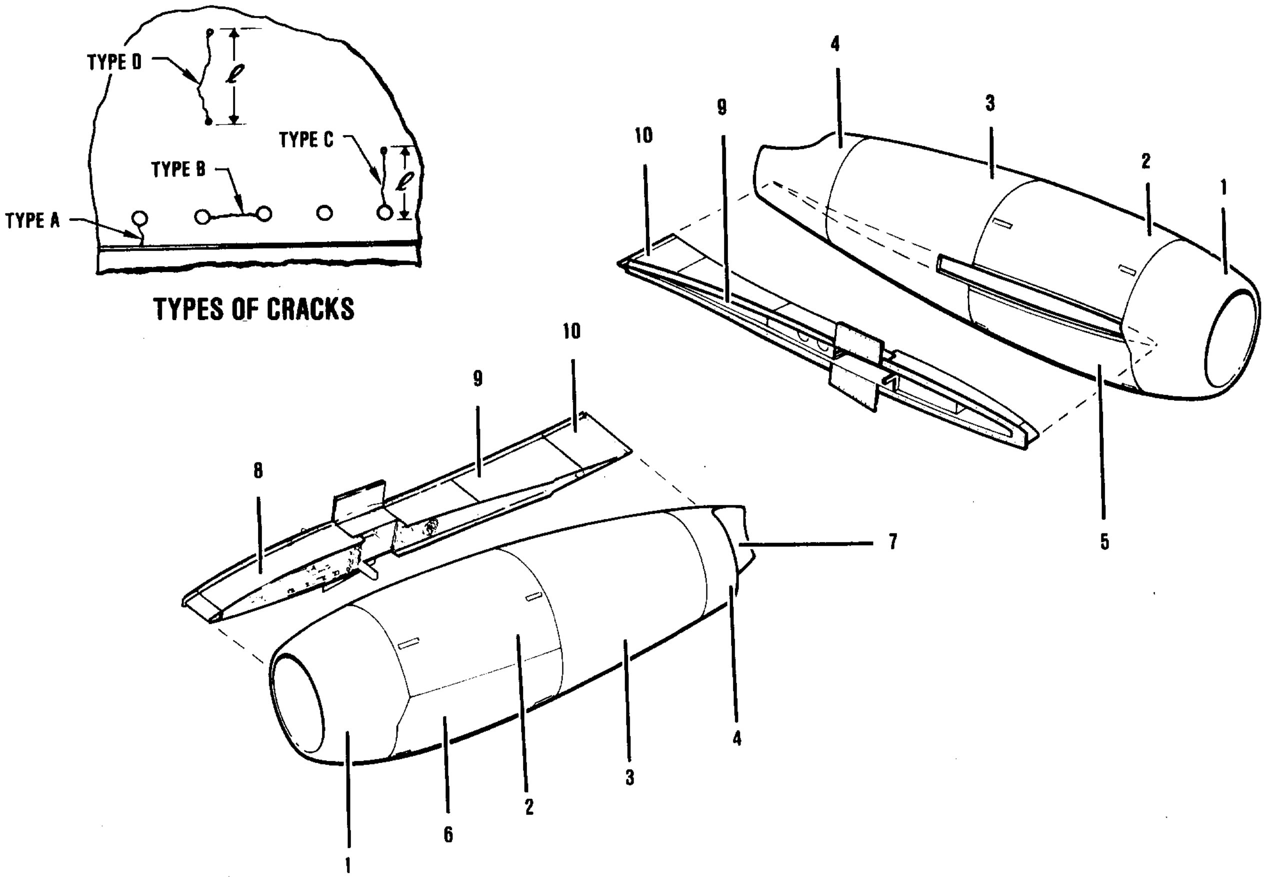
Negligible Damage — Nacelle and Pylon — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 101 (Sheet 2 of 3)



NOTES

- A MAXIMUM OF SIX RIVET HOLES (TOTAL FOR ONE OR BOTH FLANGES) MAY BE AFFECTED BY CRACKS IN EACH FITTING.
- WHEN DAMAGE EXCEEDS THE LIMITS GIVEN, THE PART MUST BE REPAIRED OR REPLACED.

Negligible Damage — Nacelle and Pylon —
Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 101 (Sheet 3 of 3)



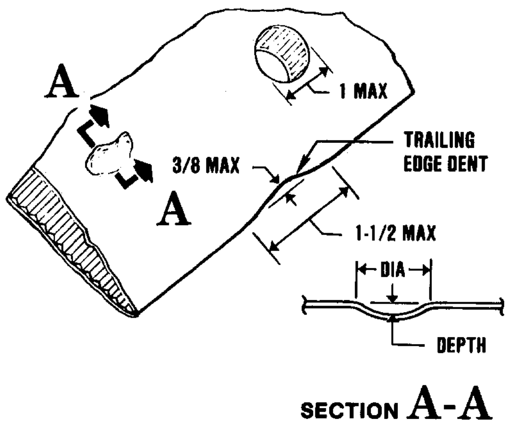
CRACKS — PYLON & NACELLE				
PANEL NO.	TYPE A	TYPE B	TYPE C	TYPE D
1	1 WITH 4 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
2	1 WITH 4 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
3	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
4	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
5	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
6	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
7	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	1 WITH 6 GOOD HOLES EACH SIDE OF DAMAGE	ℓ = 1 IN.
8	1 (MAX) IN ANY ONE ROW OF RIVETS	1 (MAX) IN ANY ONE ROW OF RIVETS	1 (MAX) IN ANY ONE ROW OF RIVETS	ℓ = 1 IN. (3 CRACKS MAX)
9	NONE	NONE	NONE	ℓ = 1 IN.
10	HONEYCOMB	HONEYCOMB	HONEYCOMB	HONEYCOMB

S370-3-30

NOTE

STOP-DRILL ALL CRACKS WITH A NO. 40 (0.098 IN.) DRILL.

Figure 102 — Negligible Damage — Nacelle and Pylon — Model NA 265-70, (S/N 370-1 and -7), -80, -80A, and -80SC (Sheet 1 of 2)



HONEYCOMB DENTS

DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS
1	0.030	3 IN.
2	0.050	4 IN.
3	0.070	5 IN.

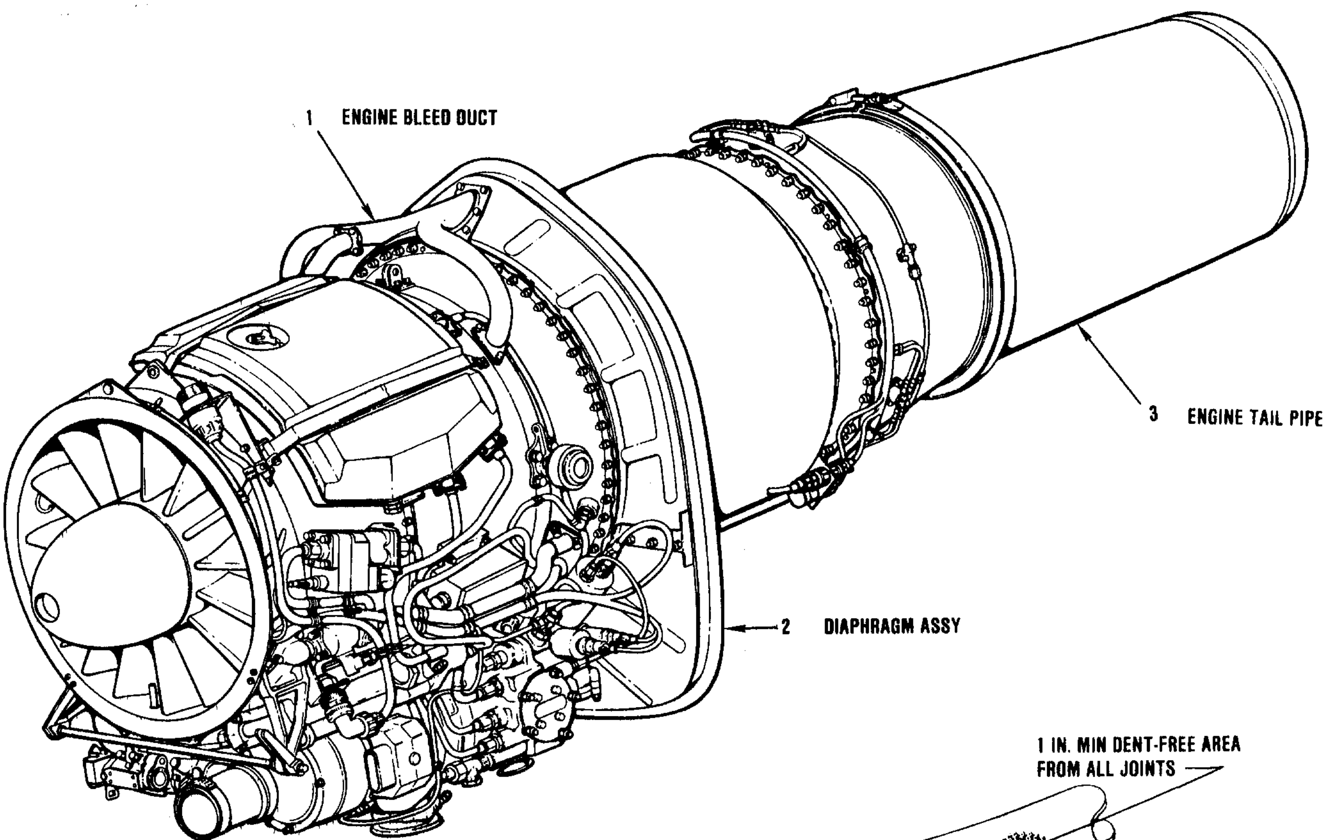
PYLON AND NACELLE								
	SCRATCHES				DENTS			
	CIRCUMFERENTIAL		LONGITUDINAL		1/2 DIA	1 DIA	2 DIA	3 AND OVER
PANEL NO.	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	DEPTH IN IN.	DEPTH IN IN.	DEPTH IN IN.
1	20% SKIN THICKNESS	2	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
2	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
3	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
4	30% SKIN THICKNESS	4	30% SKIN THICKNESS	11	1/16	1/8	5/32	3/16
5	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
6	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6	1/16	1/8	5/32	3/16
7	30% SKIN THICKNESS	4	30% SKIN THICKNESS	11	1/16	1/8	5/32	3/16
8	0.008	4	0.008	8	1/16	1/8	5/32	3/16
9	NONE	—	NONE	—	1/16	1/8	5/32	3/16
10	0.002	UNLIMITED	0.002	UNLIMITED	1/32	3/64	1/16	5/64

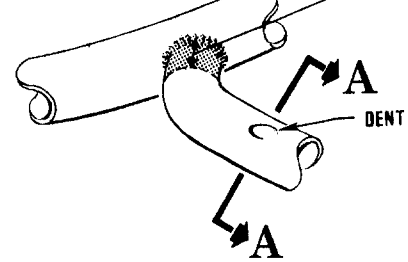
S370-3-31

NOTE

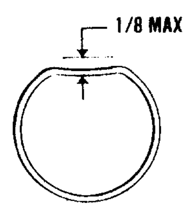
BEFORE ANY DAMAGE CAN BE CONSIDERED NEGLIGIBLE, THE AREA MUST BE TESTED FOR DELAMINATION. DIMENSIONS SHOWN FOR TRAILING EDGE DENTS ARE TYPICAL FOR ALL TRAILING EDGES. ALL HOLES MUST BE PLUGGED.

Negligible Damage — Nacelle and Pylon —
Model NA 265-70, (S/N 370-1 and -7) -80, -80A, and -80SC
Figure 102 (Sheet 2 of 2)





ENGINE BLEED DUCT



SECTION A-A

NOTES

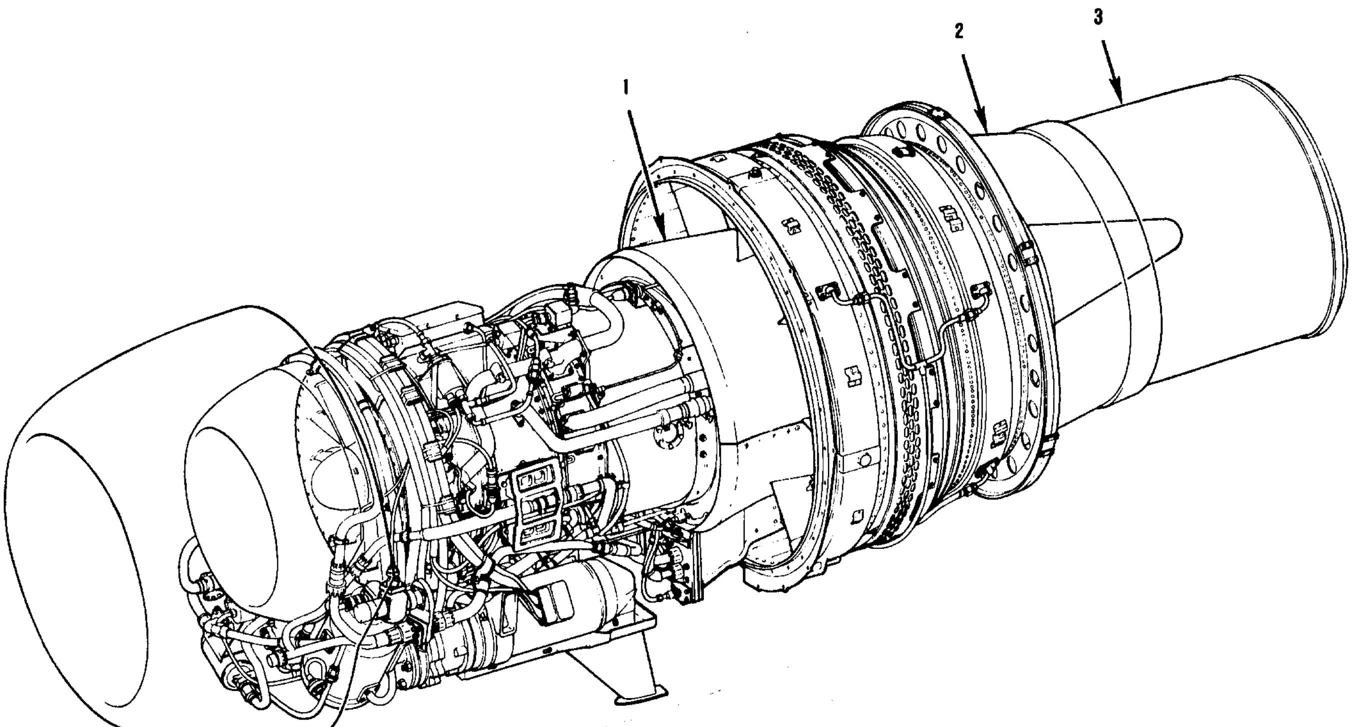
- DAMAGE WITHIN THE LIMITS GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER BEING TREATED AS DESCRIBED IN 51-70-70.
- DATA APPLIES TO ITEMS INDICATED ONLY.
- ENGINE AIR INTAKE DUCT NEGLIGIBLE DAMAGE LIMITATIONS ARE WITH THE NACELLE SKIN NEGLIGIBLE DAMAGE LIMITATIONS.

A DENTS MUST NOT BE LOCATED OPPOSITE EACH OTHER SO AS TO REDUCE THE DIAMETER IN EXCESS OF 1/8 IN.

ITEM NO.	DENTS		SCRATCHES
	MIN DIA	MAX DEPTH	
1	——	**A** 1/8	NONE
2	3 OR LARGER	3/8	20 PERCENT OF SKIN THICKNESS
	2	1/4	
	1	1/8	
	1/2	1/16	
3	1 1/2	1/8	NONE
	3/4	1/16	NONE

S265-3-170

Negligible Damage — Diaphragm Assembly and Tail Pipe —
Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 103



NOTES

- DAMAGE WITHIN THE LIMITS GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER BEING TREATED AS DESCRIBED IN 51-70-70.
- DATA APPLIES TO ITEMS INDICATED ONLY.
- ENGINE AIR INTAKE DUCT NEGLIGIBLE DAMAGE LIMITATIONS ARE WITH THE NACELLE SKIN NEGLIGIBLE DAMAGE LIMITATIONS.

ITEM NO.	DENTS		SCRATCHES
	MIN DIA	MAX DEPTH	
1	2	1/4	20 PERCENT SKIN THICKNESS
2 & 3	3 OR LARGER	3/8	NONE
	2	1/4	
	1	1/8	
	1/2	1/16	

S370-3-32

Negligible Damage — Engine Inner Fairing and Tail Pipe —
Model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 104

AUXILIARY STRUCTURE

STRUCTURAL IDENTIFICATION

GENERAL

This section contains information on the auxiliary structure of the nacelles and pylons. For negligible damage limits, refer to 54-00-10. For repairs refer to 54-20-20.

AUXILIARY STRUCTURE

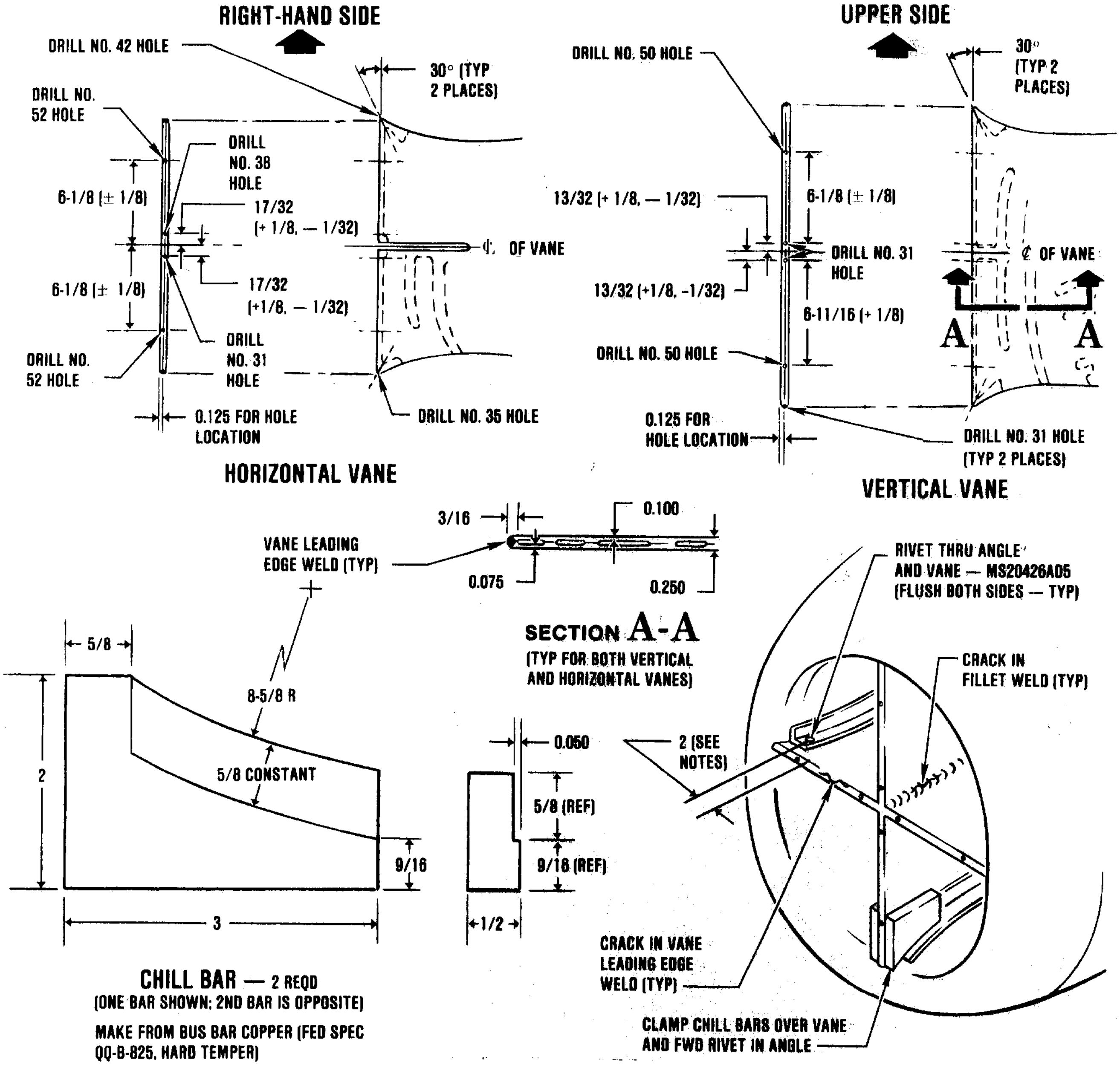
REPAIR

GENERAL

This section contains repairs of the auxiliary structure of nacelles and pylons.

REPAIRS

See figure 201.



NOTES

- THIS REPAIR IS APPLICABLE TO LEADING EDGE WELD AND FILLET WELD CRACKS IN THE ENGINE INLET AIR DUCT VANES.
- WHEN VANE LEADING EDGE CRACKS ARE 2 IN. (OR MORE) FROM FWD VANE-TO-ANGLE ATTACH RIVET (SEE ASSEMBLED VIEW), PROTECT RIVET WITH CHILL BARS. WHEN CRACK IS LESS THAN 2 IN. FROM REFERENCED RIVET, REPLACE RIVET AFTER WELDING.
- DUCT VANE MATERIAL IS 6061-T6.
- ALL WELDS ARE TO BE MADE BY THE TUNGSTEN INERT GAS PROCESS. WELDING IS TO BE IN ACCORDANCE WITH SPECIFICATION MIL-W-8604 (AER) EXCEPT THAT FLUX MUST NOT BE USED. (FLUX COULD BE ENTRAPPED WITHIN THE VANES.) USE 4043 ALUMINUM WELDING ROD.

1 Grind out weldment, grinding slightly past ends of crack.

2 Reweld ground-out area. Build up weldment on vane leading edges to allow for filing and blending with adjacent areas.

CAUTION

- WHEN WELDING VANE LEADING EDGES, USE CHILL-BARS OR REPLACE FWD ATTACH RIVET AS APPLICABLE.
- DO NOT FILE INTO PARENT MATERIAL.

3 Redrill leading edge anti-icing air outlet holes as required.

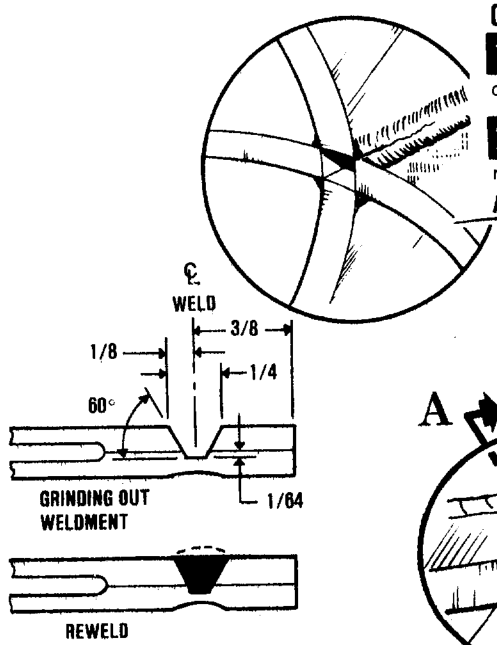
S265-3-174

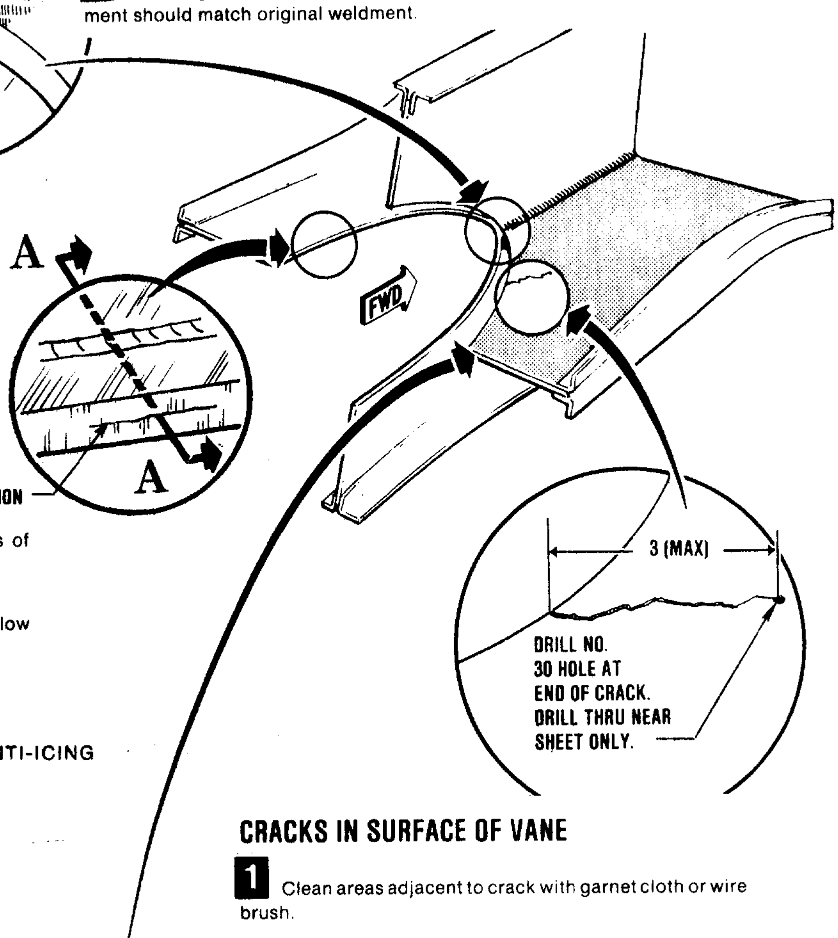
Engine Inlet Air Duct Vane Repair — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 201 (Sheet 1 of 2)

CRACKS IN FILLET WELD

1. Grind out weldment, grinding slightly past end of crack.

2. Reweld ground-out area. Configuration of new weldment should match original weldment.





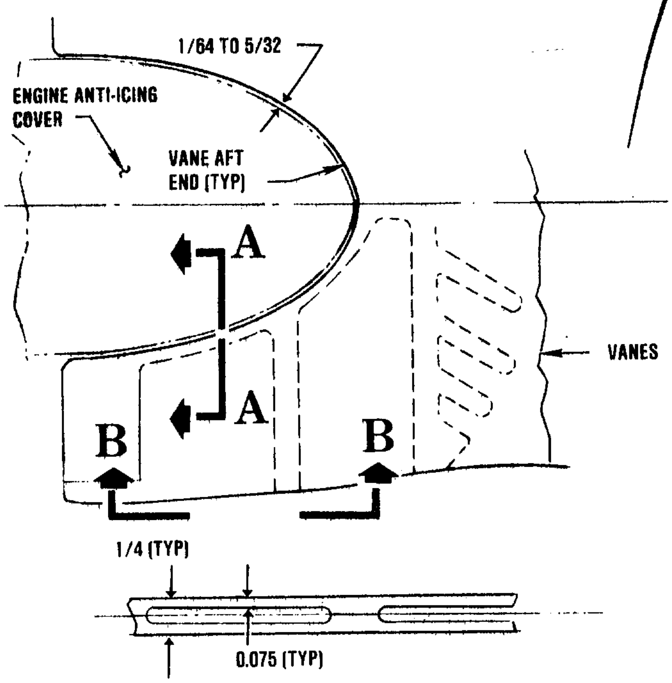
SECTION A-A

1. Grind out weldment, grinding slightly past ends of crack.

2. Reweld ground-out area. Build up weldment to allow for filing and blending with adjacent area.

NOTE

SEE SKETCH BELOW FOR VANE-TO-ANTI-ICING COVER CLEARANCE.



SECTION B-B VANE CONSTRUCTION DETAILS

CRACKS IN SURFACE OF VANE

1. Clean areas adjacent to crack with garnet cloth or wire brush.

2. Stop-drill end of crack.

3. Perform welding operation.

4. File weldment to a maximum height of 3/64 in. (when weldment exceeds that dimension).

NOTES

- CAREFULLY INSPECT BURN-DOWN WELD ON AFT EDGE OF VANE WHENEVER CRACKS ARE FOUND ON SURFACE OF A VANE.
- ALL WELDS ARE TO BE MADE BY THE TUNGSTEN INERT GAS PROCESS. WELDING IS TO BE IN ACCORDANCE WITH MILITARY SPECIFICATION MIL-W-8604 (AER) EXCEPT THAT FLUX MUST NOT BE USED. (FLUX COULD BE ENTRAPPED WITHIN THE VANES.) USE 4043 WELDING ROD.

S265-3-175

**Engine Inlet Air Duct Vane Repair — Model NA 265-40, -60, -60A, -60SC and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 201 (Sheet 2 of 2)**

PLATES AND SKINS

STRUCTURAL IDENTIFICATION

GENERAL

This section contains information on the plates and skins on nacelles and pylons. For negligible damage limits refer to 54-00-10. For repairs refer to 54-30-20.

PLATES AND SKINS

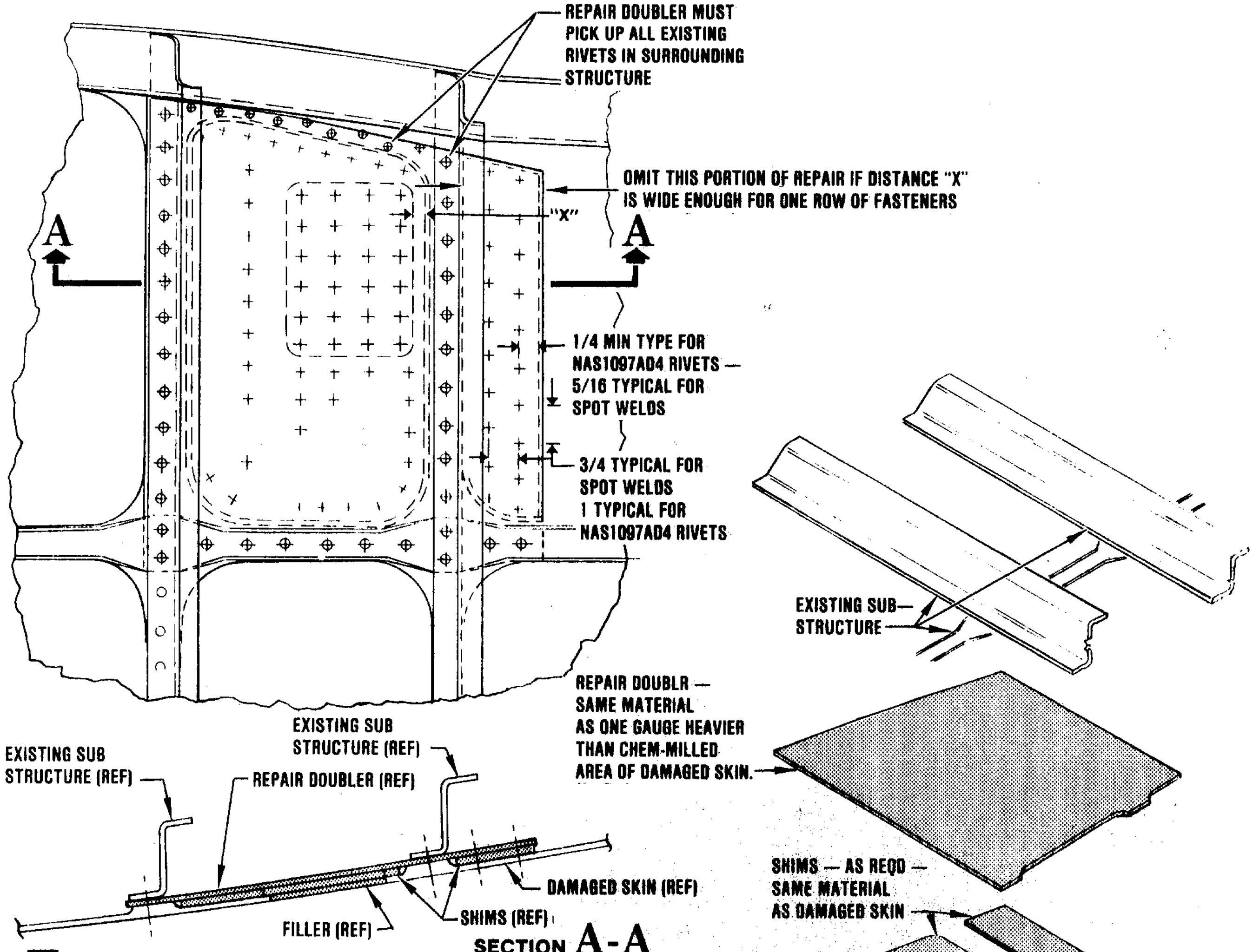
REPAIR

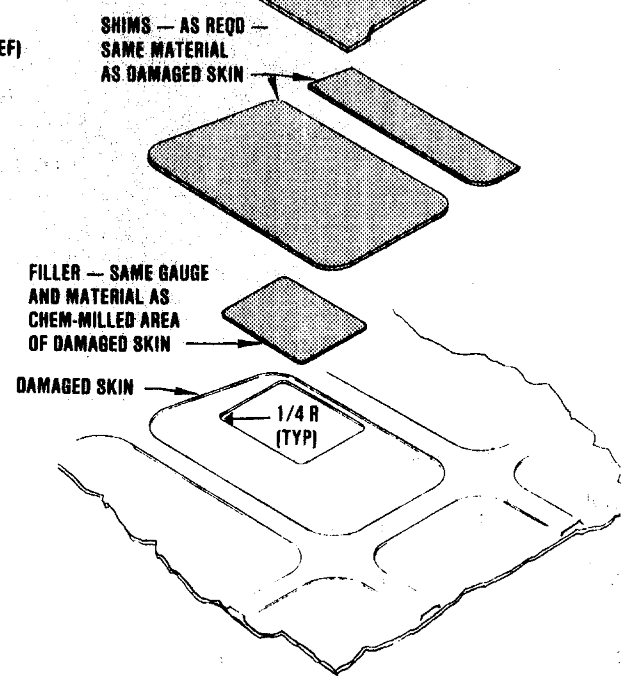
GENERAL

This section contains repairs on the plates and skins on nacelles and pylons.

REPAIRS

See figures 201 and 202.





1 Trim out damage to a square or rectangular shape.

2 Smooth all edges and corners. Corners must have a minimum radius of 1/4 in.

3 Make filler from same type of material as damaged skin, the same thickness as the thinned area of chem-milled skin

4 Make shims to match the chem-milled areas covered by the repair doubler.

5 Make repair doubler from same material as damaged skin, one gauge heavier than thinned areas of the chem-milled skin.

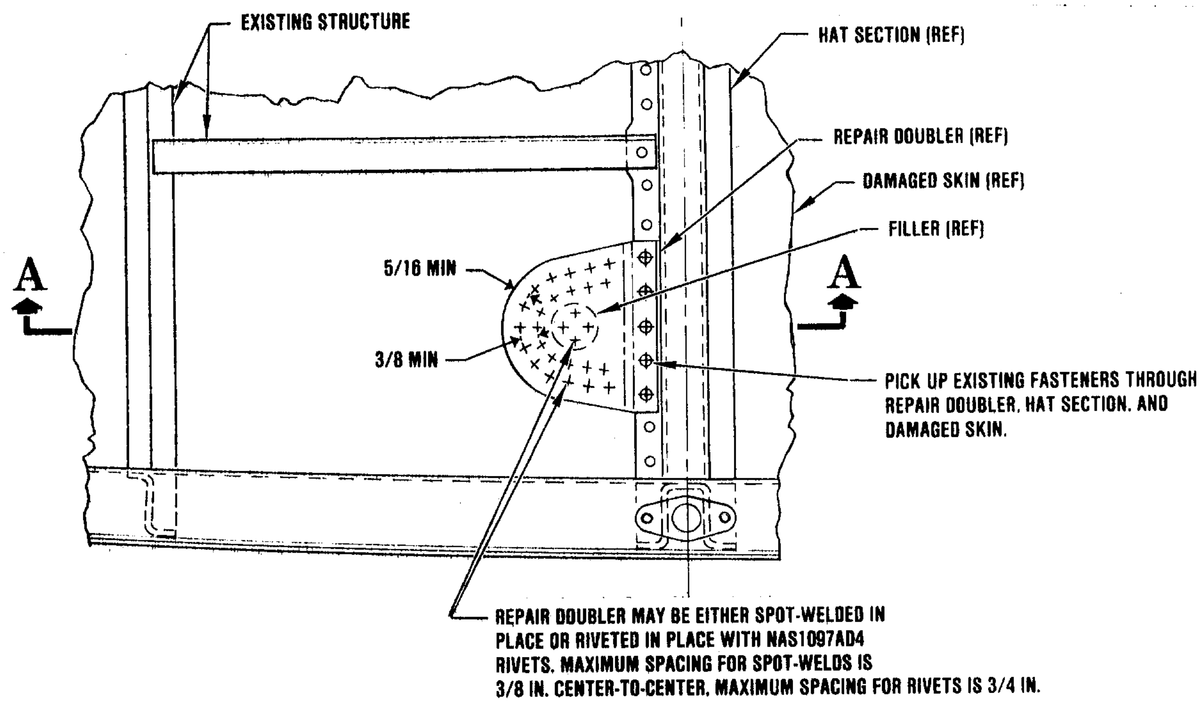
6 Fasten repair doubler, shims, and filler in place either by riveting with NAS1097AD4 rivets or by spot-welding.

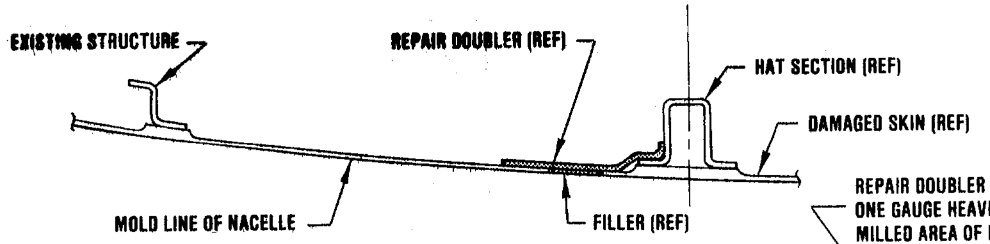
7 If repair is to be riveted with NAS1097AD4 rivets, space rivets one in. on-center, 1/4 in minimum edge distance, throughout the repair

8 If repair is to be spot-welded, space spot welds 3/4 in on-center, 5/16 in. edge distance.

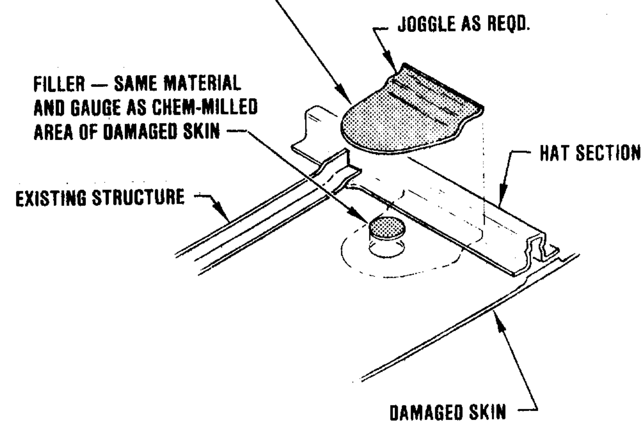
S265-3-176

Nacelle Skin Repair — Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 201 (Sheet 1 of 2)





SECTION A-A



1 Trim out damage and smooth all edges and corners.

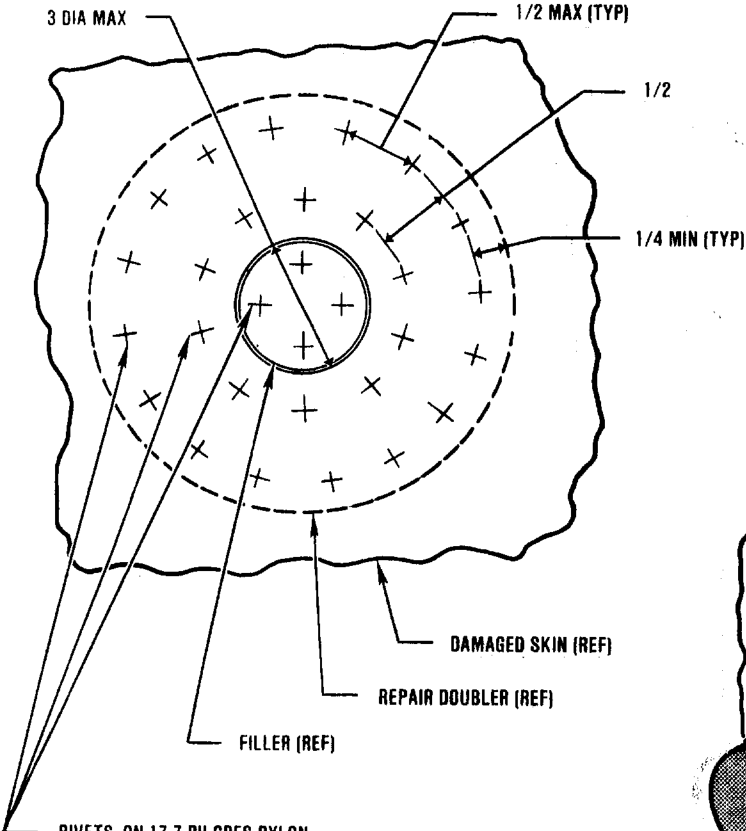
2 Make filler to match trimmed-out area.

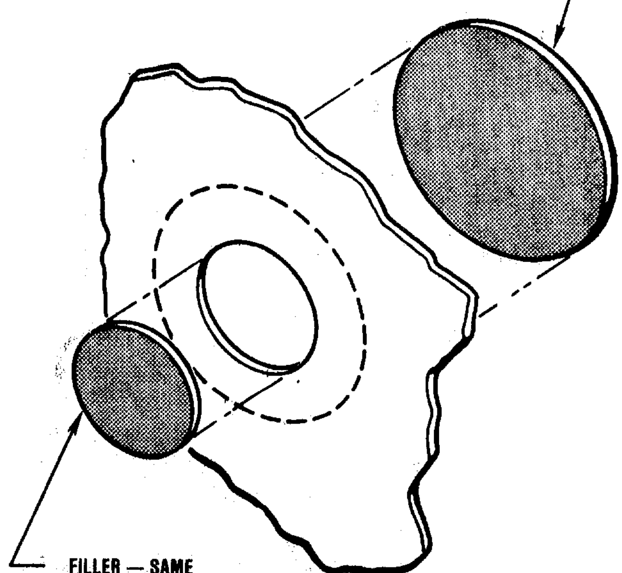
3 Make repair doubler. Joggle and contour it to match existing skin.

4 Fasten repair doubler and filler in place, either by spot-welding or by using NAS1097AD4 rivets. Maximum spot-weld spacing is 3/8 in. Maximum rivet spacing is 3/4 in.

S265-3-177

Nacelle Skin Repair — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 201 (Sheet 2 of 2)





1 Trim out damage to a maximum diameter of 3 in.

2 Measure thickness of damaged skin, to determine required repair doubler and filler thicknesses.

3 Lay out and drill rivet pattern on damaged skin.

4 Locate repair doubler in correct position, and pick up existing rivet pattern from damaged skin.

5 Countersink damaged skin, and fasten repair doubler in place, using the required size and type of rivet and spacing required.

6 Fasten filler in place, using required size and type of fasteners, and spacing called out.

NOTE

THIS REPAIR IS TO BE USED ON THE DAMAGED AREA ON THE UPPER AND LOWER PYLON SKINS. ACCESS TO THE DAMAGED AREA IS GAINED THROUGH THE ACCESS DOORS ON THE LOWER PYLON SKINS.

S265-3-178

Nacelle and Pylon Skin Repair
Figure 202

ATTACH FITTINGS

STRUCTURAL IDENTIFICATION

GENERAL

This section contains information on attach fittings on nacelles and pylons. For negligible damage limits, refer to 54-00-10. For repairs, refer to 54-40-20.

ATTACH FITTINGS

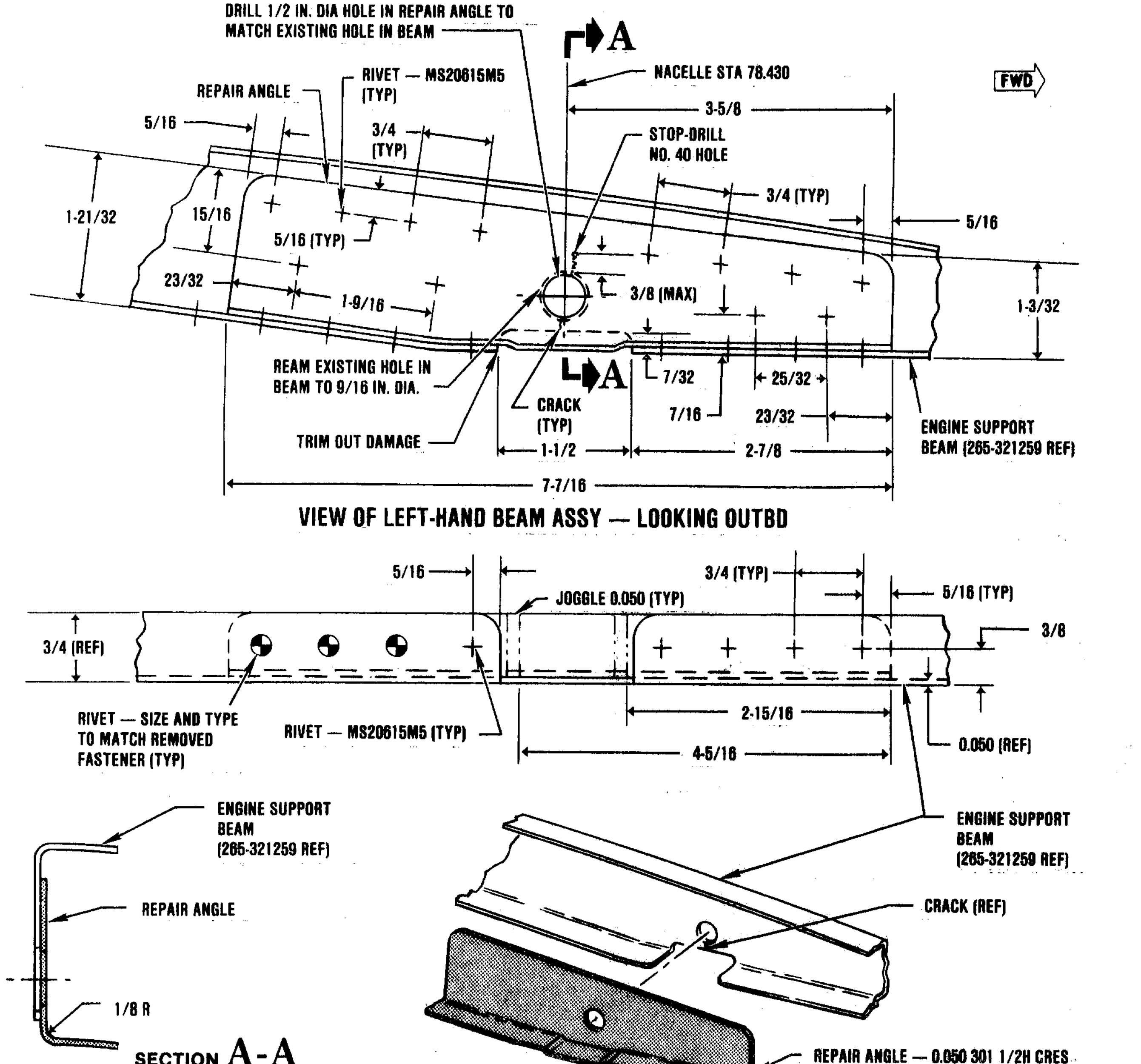
REPAIR

GENERAL

This section contains repairs on the attach fittings on nacelles and pylons.

REPAIRS

See figures 201 and 202.



1 Trim out damage as shown.

2 Form repair angle to fit beam.

3 Position and clamp repair angle on beam and scribe circumference of 1/2 in. hole.

4 Heat-treat repair angle to 180,000-200,000 psi if material used is 17-7PH CRES.

NOTE

THIS REPAIR IS APPLICABLE TO CRACKED INBD CHANNELS OF THE ENGINE SUPPORT BEAMS WITHIN LIMITS SHOWN.

5 Remove clamps, locate 1/2 in. hole center, and drill hole.

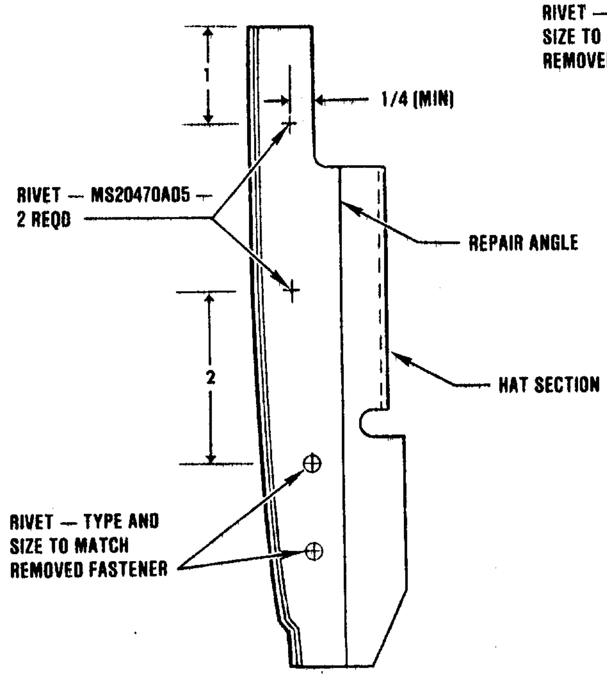
6 Drill rivet holes in wider leg of repair angle. Reassemble repair angle to beam, aligning angle with a 1/2 in. bolt. Line-drill rivet holes in beam web.

7 Remove repair angle and enlarge existing 1/2 in. hole in beam web to 9/16 in.

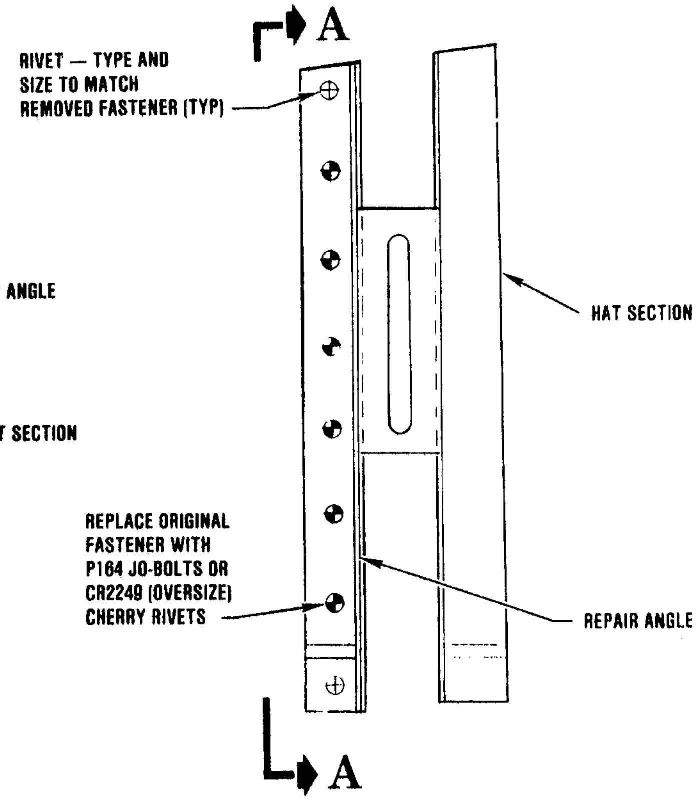
8 Reassemble repair angle. Drill rivet holes through repair angle and beam flange, and rivet repair in place.

S265-3-179

Engine Support Beam Repair — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 201



SECTION A-A



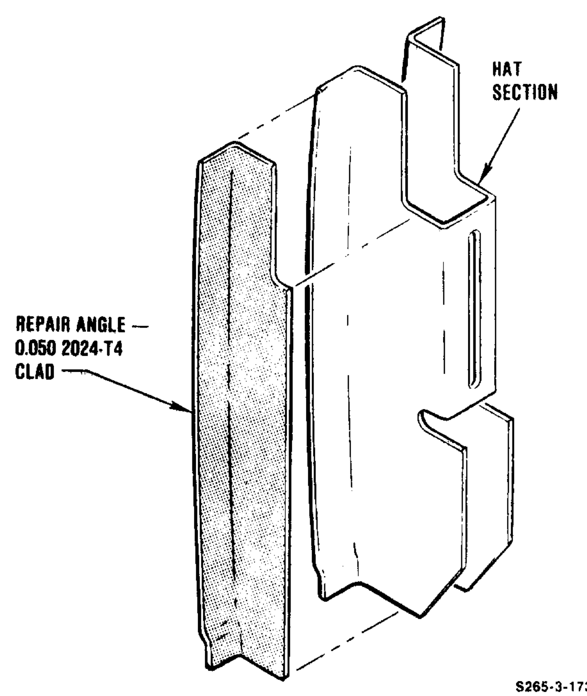
1 Remove door hinge slide assembly to provide access for bucking rivets inside hat section. To remove cross pin from slide assembly:

a. Position cross pin at top of slot in hat section.
b. Press slide assembly outbd to extend cross pin through slot enough to grip pin with a drill motor chuck.
c. Fasten drill motor chuck tightly to cross pin and spin pin out of slide assembly.
d. Pull slide assembly out through bottom of hinge bracket.

2 Stop-drill any cracks that terminate within the part. Use No. 30 drill.

3 Fabricate and install repair angle(s).

4 Reinstall door hinge slide assembly. To install cross pin in slide assembly, wedge steel bar behind slide assembly and tap cross pin in with hammer.



NOTES

- THIS REPAIR IS APPLICABLE TO CRACKED FLANGES ON LOWER NACELLE DOOR HINGE BRACKETS (NACELLE STATIONS 84.875 AND 115.50).
- A NEW HAT SECTION MAY BE FABRICATED FROM 0.040 IN. 7075-O or 7178-O MATERIAL. HEAT-TREAT PART TO T6 CONDITION AFTER FORMING. NEW PART MAY BE INSTALLED WITH FASTENERS AS CALLED OUT FOR REPAIR.

Lower Nacelle Door Hinge Bracket Repair — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 202

CHAPTER

55

STABILIZERS

CHAPTER 55

STABILIZERS

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STABILIZERS

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CHAPTER 55

STABILIZERS

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	3*	Mar 16/90
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	210	Aug 17/84
	211	Aug 17/84
	212	Aug 17/84

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER 55

STABILIZERS

STRUCTURAL IDENTIFICATION

GENERAL

The empennage group consists of a fixed vertical stabilizer, a rudder, a rudder trim tab, a trimmable horizontal stabilizer, an elevator, and fillets. The vertical and horizontal stabilizers are swept back 30° at the 25% plane.

HORIZONTAL STABILIZER

The horizontal stabilizer is of full cantilever construction. It consists of two neutral (noninterchangeable) panels, connected by a pivoted beam through the fuselage. The complete assembly rotates about a pivot axis at FS 466.53 and WP 20 for longitudinal trim. The structure is a single-cell box with a rear beam, two fwd longitudinal stringers, and transverse ribs. The structure has upper and lower skins, a leading edge skin, and a tip.

ELEVATOR

The elevators are neutral interchangeable panels, interconnected through a torque tube. The structure is a single-cell torque box consisting of a rear beam, two fwd longitudinal stringers, and transverse ribs. The rear beam incorporates a sheet-metal channel and a honeycomb sandwich panel trailing edge. The structure is covered with upper and lower skins, a leading edge skin, and a tip.

The elevator is suspended from the stabilizer rear beam by three hinges. The elevator is both aerodynamically and statically balanced. Static balance is achieved by a series of steel weights attached to the inner side of the leading edge skin.

VERTICAL STABILIZER

The vertical stabilizer is an all-metal, fully cantilevered structure with a laminated glass cloth tip. The main box structure consists of a full length rear beam, a short lower front beam, transverse ribs, two longitudinal stringers, and side and leading edge skins. The box section above the rudder is formed by the rear beam, a honeycomb panel trailing edge, and side skins. The vertical stabilizer is attached to the fuselage by 45 bolts at the rear beam and one bolt at the front beam.

RUDDER

The rudder is a single-cell torque box consisting of a rear beam, two fwd longitudinal stringers, transverse ribs, and side and leading edge skins. The rear beam consists of a sheet-metal channel and a honeycomb sandwich panel trailing edge, except in the area of the trim tab. The trim tab is a honeycomb sandwich panel structure with a sheet-metal channel leading edge.

The rudder is suspended from the stabilizer rear beam by three hinges and is rotated by a torque tube attached to the root rib. The rudder is both aerodynamically and statically balanced. Static balance is achieved by steel weights attached to the inside of the leading edge skin. The trim tab is statically balanced and rotates ±15°.

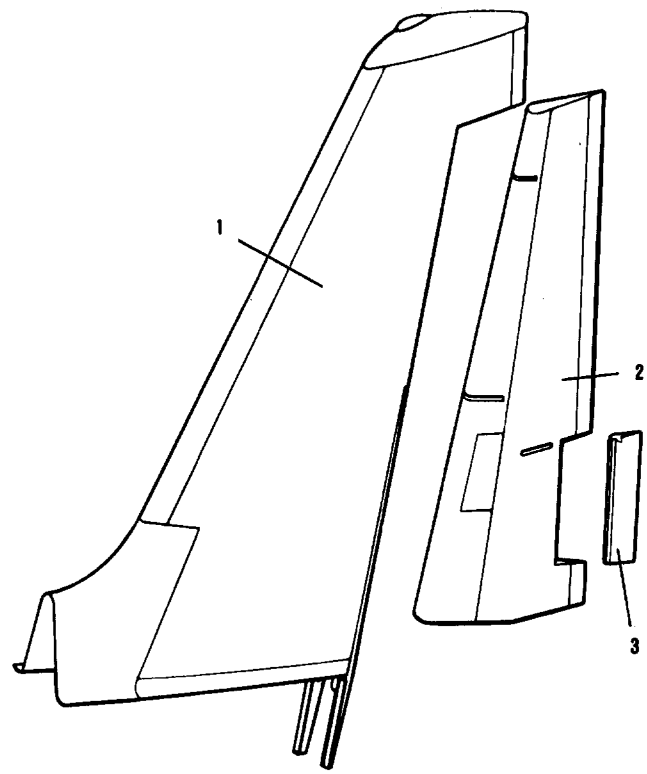
STABILIZER MASTER REPAIR INDEX

See figure 1 for model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9). See figure 2 for model NA 265-65, -70 (S/N 370-1 and -7), -80, -80A and -80SC.

STABILIZER SKIN GAP TOLERANCES

See figure 3.

ITEM NO.	NOMENCLATURE	ASSY NO.	REPAIR INDEX SECTION NO.
1	VERTICAL STABILIZER	265-230002	55-30-00 FIGURE 1 FIGURE 2 (-70)
2	RUDDER	265-240002	55-40-00 FIGURE 1 FIGURE 2 (-70)
3	RUDDER TRIM TAB	265-240501	
4	HORIZONTAL STABILIZER	265-210002	55-10-00 FIGURE 1 FIGURE 2 (-70)
5	ELEVATOR	265-220002	55-10-00 FIGURE 4 FIGURE 5 (-70)
6	INTERCONNECTING TORQUE TUBE	265-522096	
7	BEAM ASSY	265-210006	
8	TORQUE TUBE ASSY	265-220006	
	SEE 55-10-00, FIGURE 101 FOR NEGLIGIBLE DAMAGE LIMITATIONS		



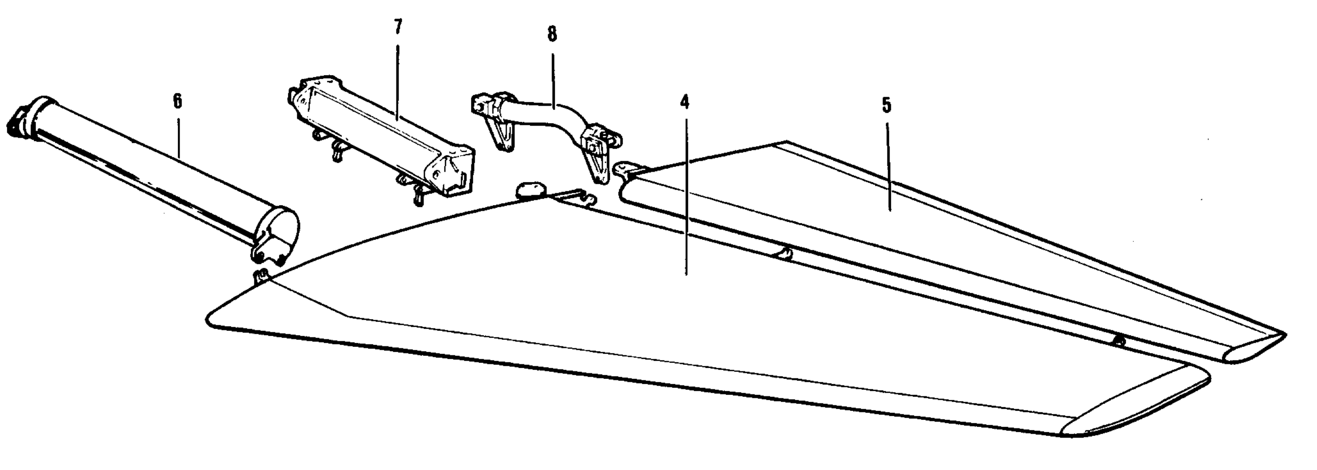


Figure 1 — Stabilizer Master Repair Index — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)

ITEM NO.	NOMENCLATURE	REPAIR INDEX SECTION NO.
1	VERTICAL STABILIZER	55-30-00 FIGURE 1 (-65) FIGURE 2
2	RUDDER	55-40-00 FIGURE 1 (-65) FIGURE 2
3	RUDDER TRIM TAB	
4	HORIZONTAL STABILIZER	55-10-00 FIGURE 2 (-70) FIGURE 3
5	ELEVATOR	55-10-00 FIGURE 5 (-70) FIGURE 6
6	INTERCONNECTING TORQUE TUBE	
7	BEAM ASSY	
8	TORQUE TUBE ASSY	
	SEE 55-00-10, FIGURE 102 FOR NEGLIGIBLE DAMAGE LIMITATIONS	

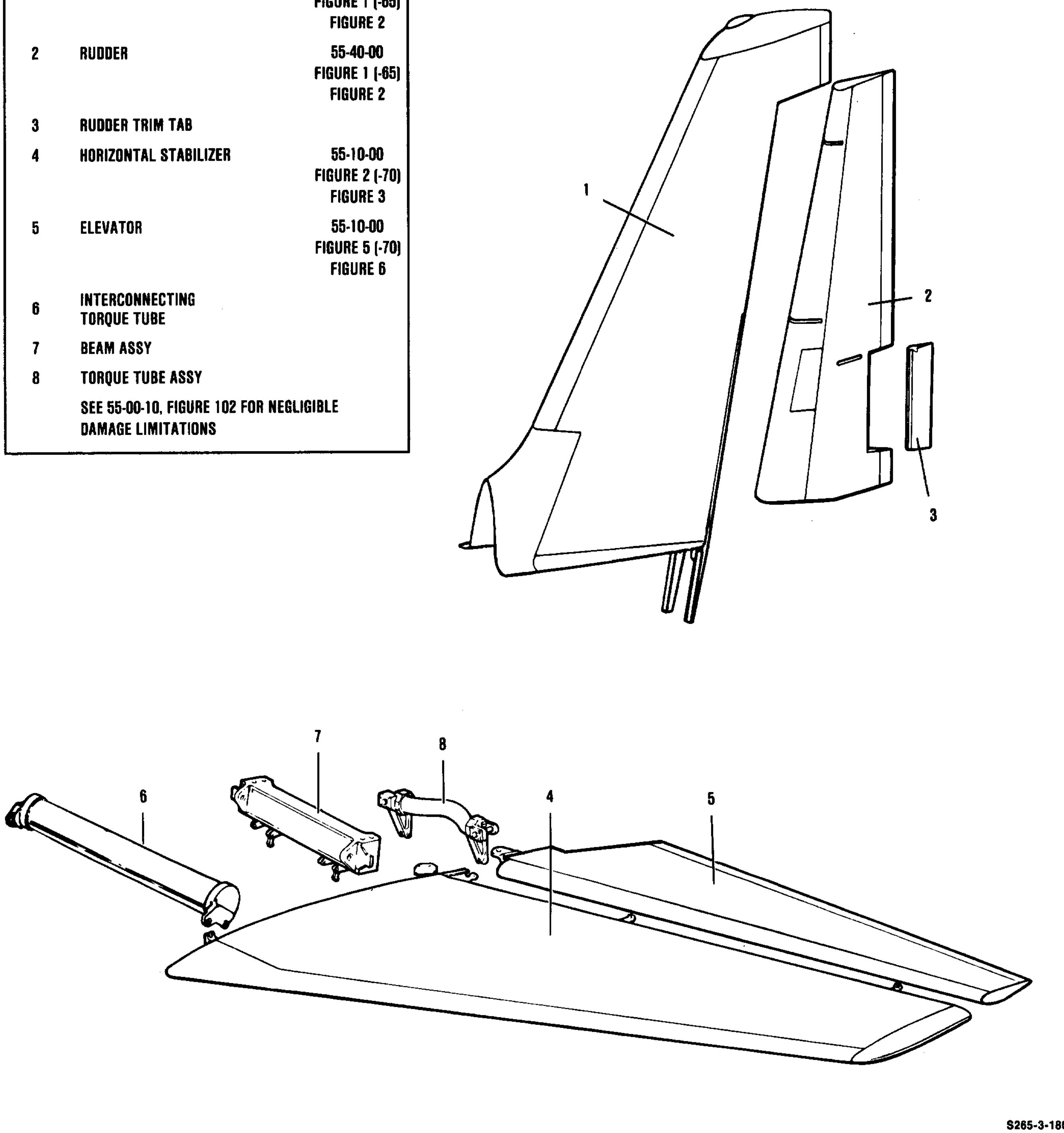
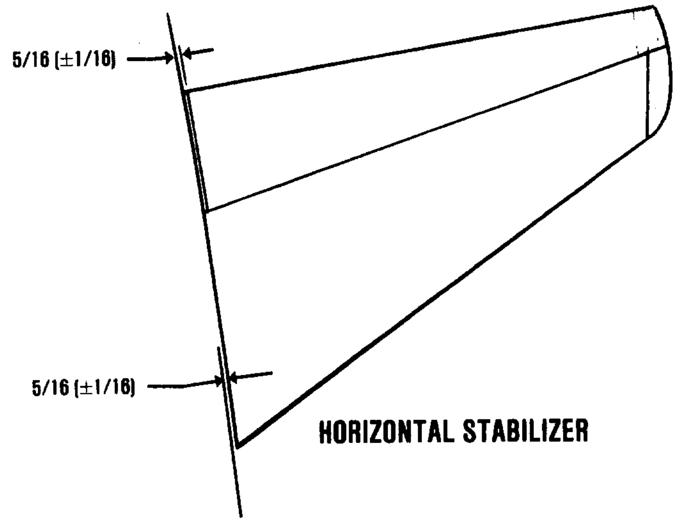
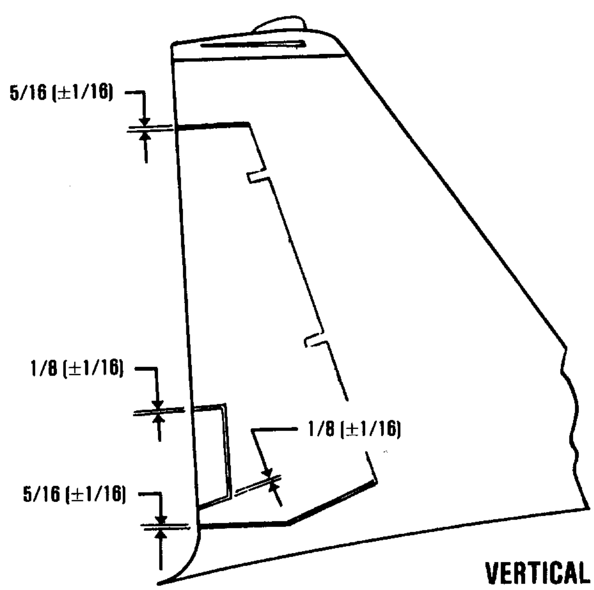


Figure 1 — Stabilizer Master Repair Index —
Model NA 265-65, -70, (S/N 370-1 and -7), -80, -80A, and-80SC





NOTES

- SKIN GAP TOLERANCES NOT SPECIFICALLY SHOWN ARE 0 TO 1/16 IN.
- SKIN GAP TOLERANCES GIVEN ON THIS ILLUSTRATION ARE FOR THE FITTING OF NEW PARTS. REFER TO "SKIN GAP TOLERANCES" TEXT FOR PERMISSIBLE TOLERANCES WHEN FITTING PARTS THAT HAVE BEEN PREVIOUSLY INSTALLED ON ANOTHER AIRPLANE.

S265-3-277

Stabilizer Skin Gap Diagram
Figure 3

STABILIZERS

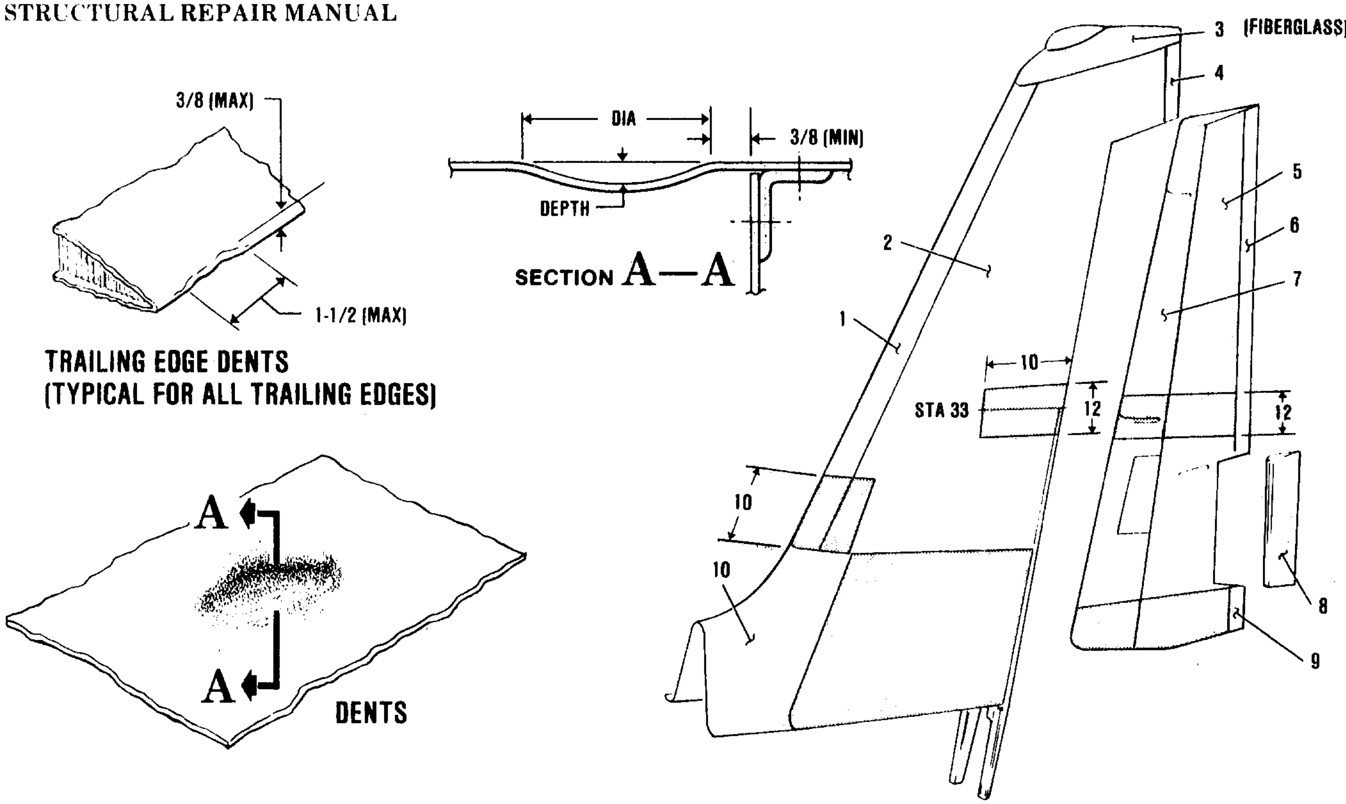
ALLOWABLE DAMAGE

GENERAL

This section contains negligible damage limits for the stabilizers.

STABILIZER NEGLIGIBLE DAMAGE LIMITS

Negligible damage limits for Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9) are given in figure 101. Negligible damage limits for Model NA 265-65, -70 (S/N 370-1 and -7), -80, -80A and -80SC are given in figure 102.



CODE AREA	SCRATCHES				DENTS			HOLES [A]	
	CHORDWISE		SPANWISE		DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS	DIA IN IN.	NUMBER PER BAY
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.					
1	0.002	3	0.002	UNLIMITED	1/8 1/4 3/8 (MAX)	0.020 0.040 0.063	2 TIMES DENT DIA	3/8	1
2	0.002	3	0.002	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16	2 TIMES DENT DIA	3/8	1
3	1 LAMINATION (0.010)	3	1 LAMINATION (0.010)	UNLIMITED	NONE		2 TIMES DENT DIA	3/8	1
4,6,8,9 HONEY-COMB	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX)	[B]
5	0.002	3	0.002	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16	2 TIMES DENT DIA	3/8	1
7	0.002	3	0.002	UNLIMITED	1/8 1/4 3/8 (MAX)	0.020 0.040 0.063	2 TIMES DENT DIA	3/8	1
10	0.005	UNLIMITED	0.005	UNLIMITED	1 3 6 (MAX)	1/64 1/16 1/8	2 TIMES DENT DIA	3 (MAX)	—

NOTES

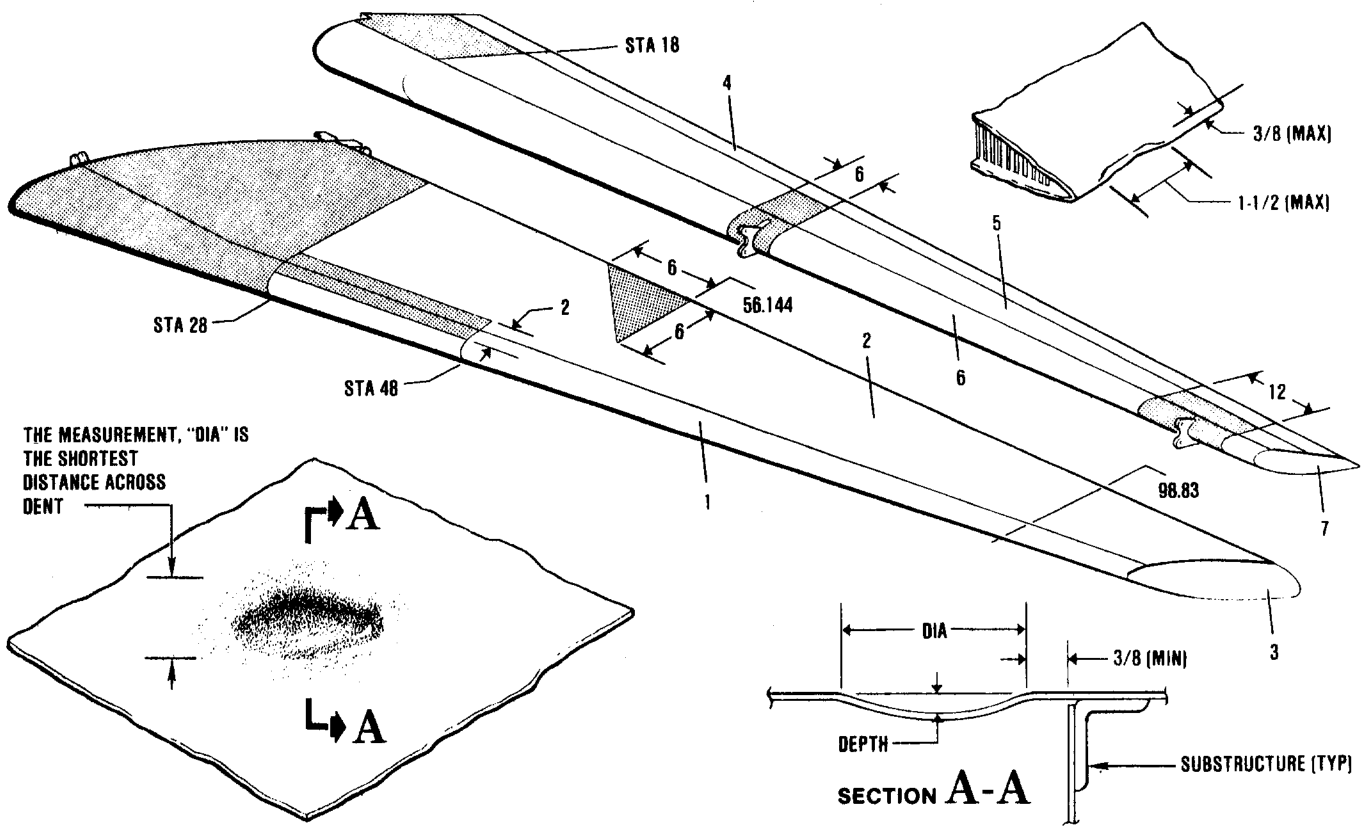
- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.
- TRAILING EDGE DENTS MAY BE REMOVED (OR PARTIALLY REMOVED) BY A CLAMPING PRESSURE. DO NOT HAMMER ON BONDED HONEYCOMB.
- DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR. THE MEASUREMENT, "DIA", IS THE SHORTEST DISTANCE ACROSS DENT.

[A] ALL SHADED AREAS CAN SUSTAIN NO DAMAGE OTHER THAN DENTS AND SCRATCHES.

[B] A MINIMUM OF 5 IN. UNDAMAGED MATERIAL BETWEEN HOLES.

S265-3-181

Negligible Damage — Stabilizers
Model NA 265-40, -60, -60A, -60SC and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 101 (Sheet 1 of 2)



CODE AREA	SCRATCHES				DENTS			HOLES [A]	
	CHORDWISE		SPANWISE		DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS	DIA IN IN.	NUMBER PER BAY
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.					
1	0.002	5	0.002	UNLIMITED	1/8 1/4 3/8	0.020 0.040 0.063		3/8	1
2	0.002	3	0.002	5	1 2 3 (MAX)	1/64 3/64 1/16		3/8	1
3	0.005	UNLIMITED	0.005	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16		3/8	1
4 HONEY-COMB	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX) PLUG ALL HOLES	[B]
5	0.002	3	0.002	3	1 2 3 (MAX)	1/64 3/64 1/16		3/8	1
6	0.002	3	0.002	UNLIMITED	1/8 1/4 3/8	0.020 0.040 0.063		3/8	1
7	0.005	UNLIMITED	0.005	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16		3/8	—

NOTES

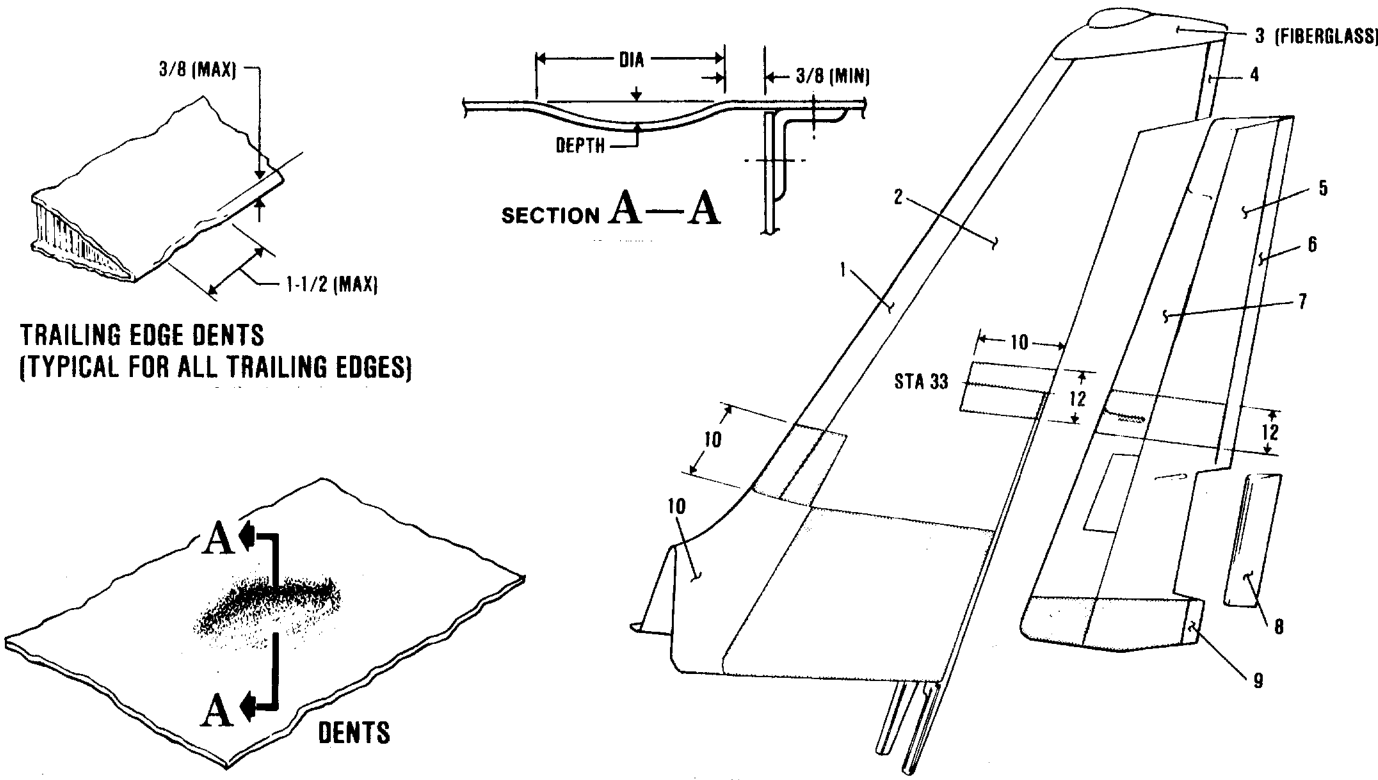
- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT DESCRIBED IN 51-70-70.
- DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR.

[A] ALL SHADED AREAS CAN SUSTAIN NO DAMAGE OTHER THAN DENTS OR SCRATCHES.

[B] A MINIMUM OF 5 IN. UNDAMAGED MATERIAL BETWEEN HOLES.

S265-3-182

Negligible Damage — Stabilizers
Model NA 265-40, -60, -60A, -60SC and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 101 (Sheet 2 of 2)



CODE AREA	SCRATCHES				DENTS			HOLES **A**	
	CHORDWISE		SPANWISE		DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS	DIA IN IN.	NUMBER PER BAY
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.					
1	0.002	3	0.002	UNLIMITED	1/8 1/4 3/8 (MAX)	0.020 0.040 0.063	2 TIMES DENT DIA	3/8	1
2	0.002	3	0.002	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16	2 TIMES DENT DIA	3/8	1
3	1 LAMINATION (0.010)	3	1 LAMINATION (0.010)	UNLIMITED	NONE		2 TIMES DENT DIA	3/8	1
4,6,8,9 HONEY-COMB	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX)	**B**
5	0.002	3	0.002	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16	2 TIMES DENT DIA	3/8	1
7	0.002	3	0.002	UNLIMITED	1/8 1/4 3/8(MAX)	0.020 0.040 0.063	2 TIMES DENT DIA	3/8	1
10	0.005	UNLIMITED	0.005	UNLIMITED	1 3 6 (MAX)	1/64 1/16 1/8	2 TIMES DENT DIA	3 (MAX)	—

NOTES

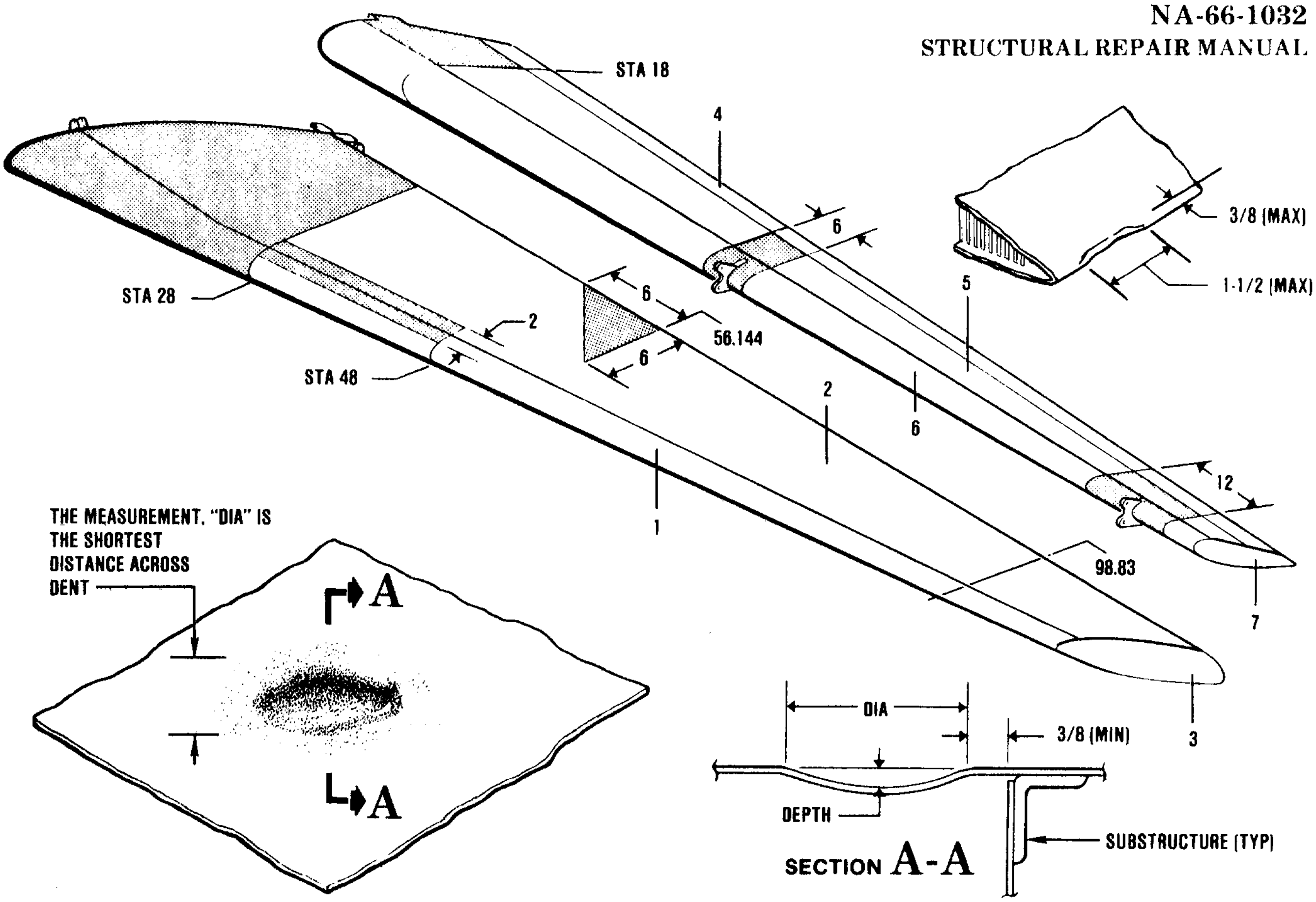
- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.
- TRAILING EDGE DENTS MAY BE REMOVED (OR PARTIALLY REMOVED) BY A CLAMPING PRESSURE. DO NOT HAMMER ON BONDED HONEYCOMB.
- DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR. THE MEASUREMENT, "DIA", IS THE SHORTEST DISTANCE ACROSS DENT.

A ALL SHADED AREAS CAN SUSTAIN NO DAMAGE - OTHER THAN DENTS AND SCRATCHES.

B A MINIMUM OF 5 IN. UNDAMAGED MATERIAL BETWEEN HOLES.

S370-3-47

Negligible Damage — Stabilizers
Model NA 265-65, -70 (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 102 (Sheet 1 of 2)



CODE AREA	SCRATCHES				DENTS			HOLES **A**	
	CHORDWISE		SPANWISE		DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS	DIA IN IN.	NUMBER PER BAY
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.					
1	0.002	5	0.002	UNLIMITED	1/8 1/4 3/8	0.020 0.040 0.063		3/8	1
2	0.002	3	0.002	5	1 2 3 (MAX)	1/64 3/64 1/16		3/8	1
3	0.005	UNLIMITED	0.005	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16		3/8	1
4 HONEY-COMB	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX) PLUG ALL HOLES	**B**
5	0.002	3	0.002	3	1 2 3 (MAX)	1/64 3/64 1/16		3/8	1
6	0.002	3	0.002	UNLIMITED	1/8 1/4 3/8	0.020 0.040 0.063		3/8	1
7	0.005	UNLIMITED	0.005	UNLIMITED	1 2 3 (MAX)	1/64 3/64 1/16		3/8	—

NOTES

- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-00.
- DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR.

A ALL SHADED AREAS CAN SUSTAIN NO DAMAGE OTHER THAN DENTS OR SCRATCHES.

B A MINIMUM OF 5 IN. OF UNDAMAGED MATERIAL BETWEEN HOLES.

S370-3-48

Negligible Damage — Stabilizers
Model NA 265-65, -70 (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 102 (Sheet 2 of 2)

STABILIZERS

REPAIR

GENERAL

The repairs for the stabilizers are given in section covering each stabilizer.

HORIZONTAL STABILIZERS

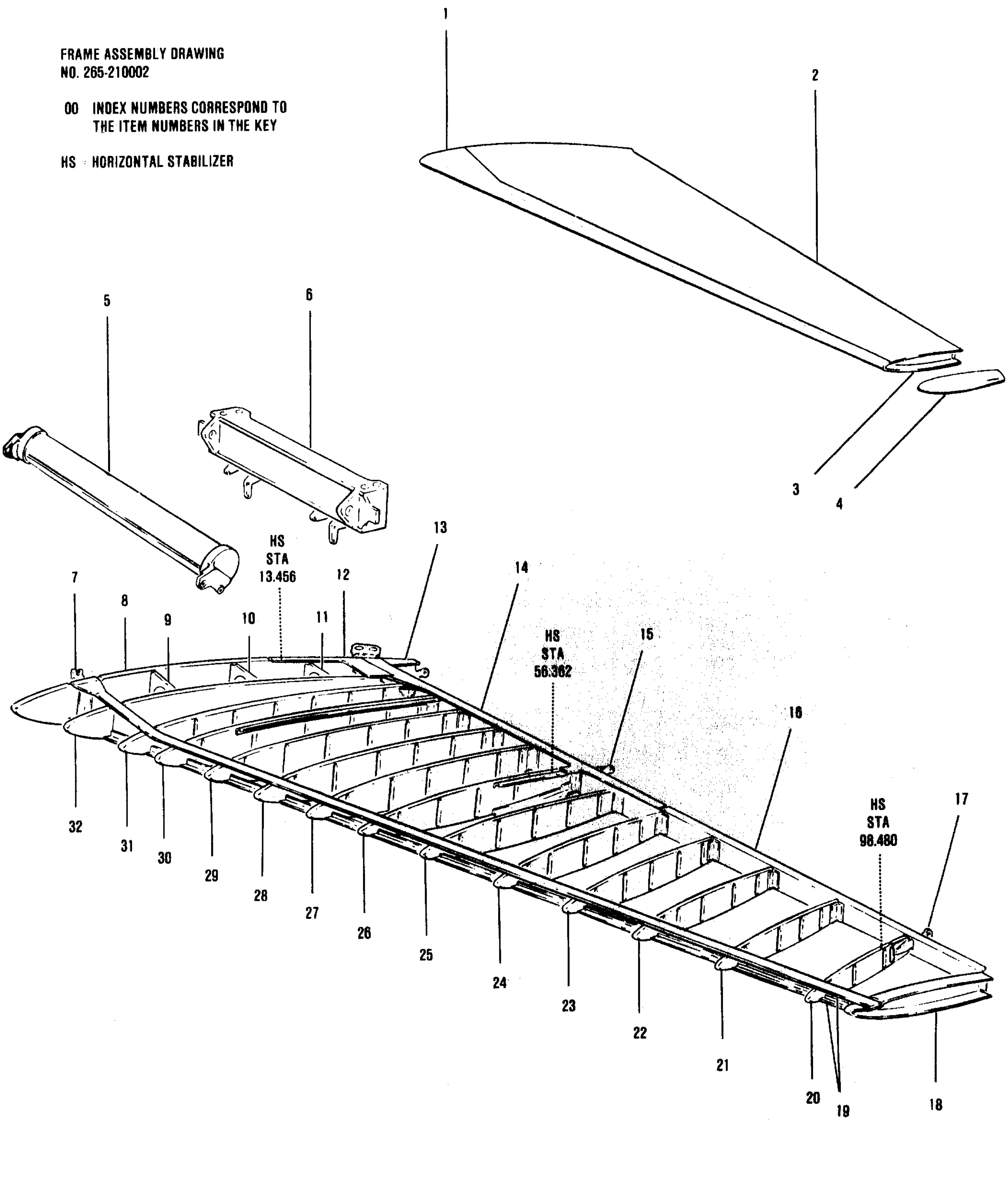
STRUCTURAL IDENTIFICATION

GENERAL

The information in this section applies to the horizontal stabilizer. For negligible damage limits, refer to 55-00-10. For repairs, refer to 55-10-20.

HORIZONTAL STABILIZER REPAIR INDEX

See figure 1 for model NA 265-40, -60, -60A, and -60SC. See figure 2 for model NA 265-70. See figure 3 for model NA 265-65, -80, -80A, and -80SC.



Horizontal Stabilizer Repair Index
Model NA 265-40, -60, -60A, and -60SC
Figure 1

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-210002-3	Skin—LE	2024-T3 Clad	0.032	55-10-20 Fig. 201
2	265-210421	Skin — Upper	2024-T3 Bare	0.050 A	55-10-20 Fig. 202, 203
3	265-210420	Skin — Lower	2024-T3 Bare	0.050	55-10-20 Fig. 202
	265-210421 B	Skin — Lower	2024-T3 Bare	0.050 A	55-10-20 Fig. 202
4	265-210311	Tip	6061-T4 Bare	0.025	
5	265-522096	Torque Tube — Interconnect	6061-T6 Tube	0.150	
6	265-210412	Beam — Center Section	7079-T6 Forging		55-10-20 Fig. 205
7	265-210401	Support — Front Beam Actuator	7075-T6 Bar	3 x 4.500	
8	265-210013	Rib — Canted Sta 13.456	7075-T6 Clad	0.063	55-10-20 Fig. 204
9	265-210306	Intercostal — Fwd	7075-T6 Clad	0.032	
10	265-210307	Intercostal — Intermediate	7075-T6 Clad	0.032	
11	265-210308	Intercostal — Aft	7075-T6 Clad	0.032	
12	265-210422	Doubler — Skin	7075-T6 Bare	0.063	
13	265-210417	Support — Inbd Hinge	7079-T6 Forging		
14	265-210402	Cap — Rear Beam	7075-T6 Bare	0.9375	
15	265-210418	Support — Intermediate Hinge	7075-T6 Bar	1.375	
16	265-210302	Beam — Rear	7075-T6 Bare	0.063	
17	265-210419	Support — Otbd Hinge	7075-T6 Extr	6E1104	
18	246-21105	Rib — Canted Sta 105.711	2024-T4 Clad	0.020	55-10-20 Fig. 204
19	265-210408	Stringer	7075-T6 Extr	4E756	
20	265-210098-11	Rib — Sta 98.480	7075-T6 Clad	0.050	55-10-20 Fig. 204
21	265-210091-3	Rib — Sta 91.424	2024-T42 Clad	0.040	55-10-20 Fig. 204
22	265-210084-3	Rib — Sta 84.368	2024-T42 Clad	0.040	55-10-20 Fig. 204
23	265-210077-3	Rib — Sta 77.312	2024-T42 Clad	0.040	55-10-20 Fig. 204
24	265-210070-3	Rib — Sta 70.256	2024-T42 Clad	0.040	55-10-20 Fig. 204
25	265-210063-3	Rib — Sta 63.200	2024-T42 Clad	0.040	55-10-20 Fig. 204
26	265-210056-11	Rib — Sta 56.362	2024-T42 Clad	0.063	55-10-20 Fig. 204
27	265-210049-3	Rib — Sta 49.568	2024-T42 Clad	0.050	55-10-20 Fig. 204
28	265-210042-3	Rib — Sta 42.991	2024-T42 Clad	0.050	55-10-20 Fig. 204
29	265-210036-3	Rib — Sta 36.415	2024-T42 Clad	0.050	55-10-20 Fig. 204
30	265-210029-11	Rib — Sta 29.839	2024-T42 Clad	0.050	55-10-20 Fig. 204
31	265-210023	Rib — Sta 23.262	2024-T42 Clad	0.050	55-10-20 Fig. 204
32	265-210018	Rib — Sta 18.340	7075-T6 Clad	0.050	55-10-20 Fig. 204

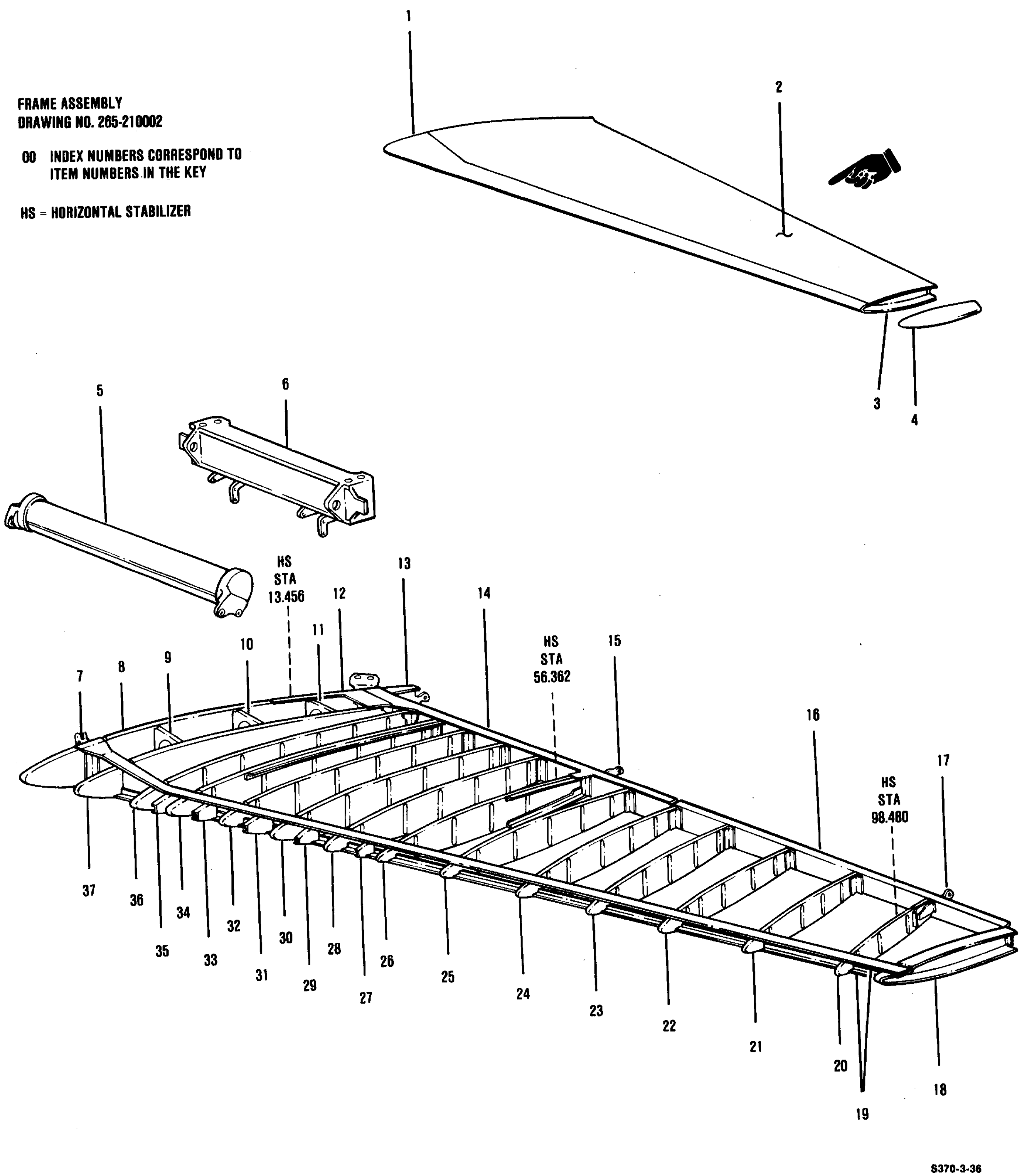
NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness.***

B ***On NA 265-40, Airplanes 282-91 and subs.***

Key to Figure 1



Horizontal Stabilizer Repair Index
Model NA 265-70
Figure 2

STRUCTURAL IDENTIFICATION (Continued)

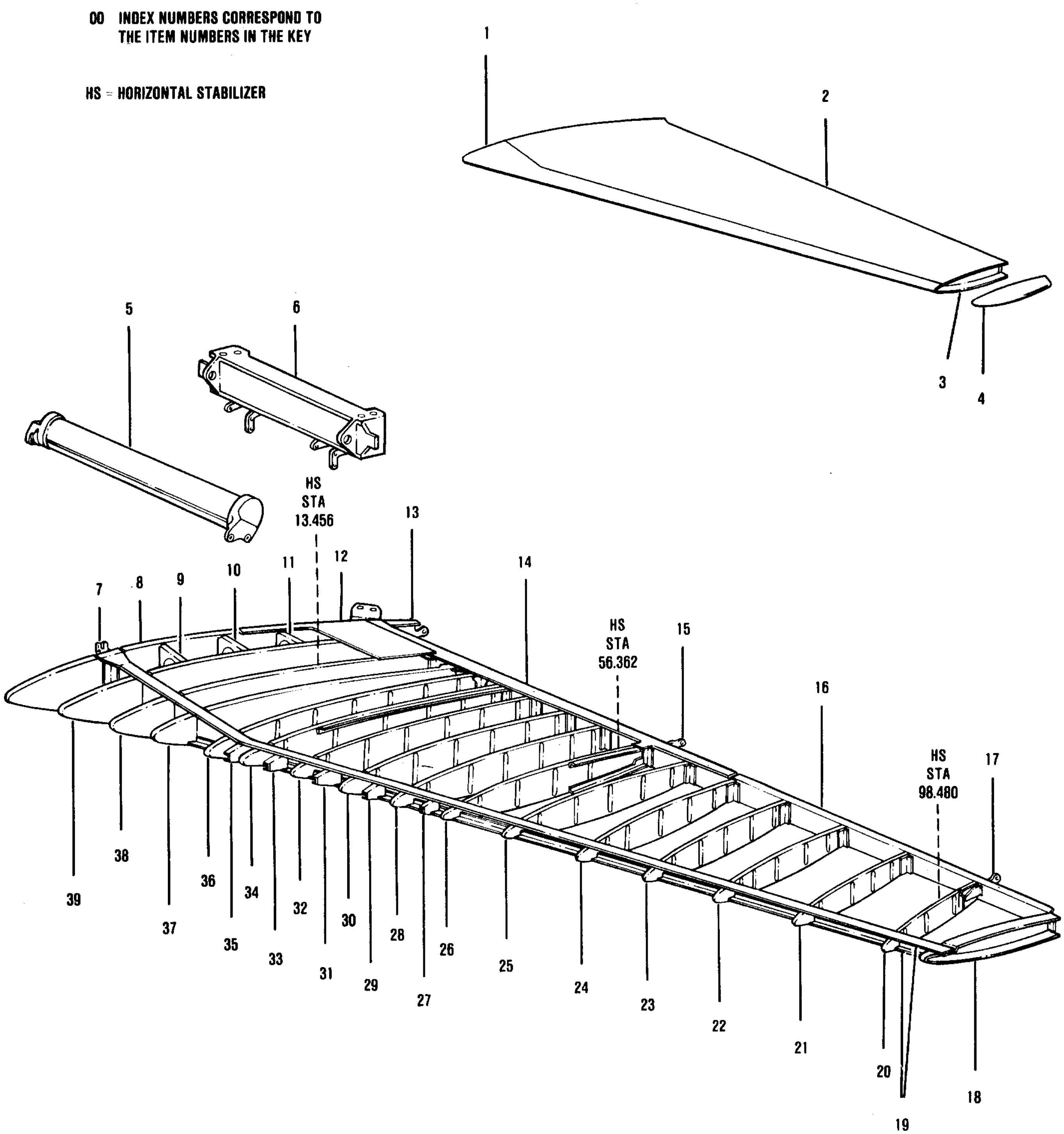
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-210002-3	Skin — Leading Edge	2024-T3 Clad	0.032	55-10-20 Fig. 201
2	265-210421-3	Skin — Upper	2024-T3 Bare	0.050 A	55-10-20 Fig. 201, 202
3	265-210421-4	Skin — Lower	2024-T3 Bare	0.050 A	55-10-20 Fig. 202
4	265-310311	Tip — Horizontal Stabilizer	6061-T4	0.025	
5			6061-T6 Tube	0.188 Wall	
6	265-210412-3	Beam — Center Section	7079-T6	Forging	55-10-20 Fig. 205
7	285-210403-3 & -4	Support — Horizontal Stabilizer	7075-T6	Die Forge	
8	265-210013	Rib — Canted Sta 13.456	7075-T6 Clad	0.063	55-10-20 Fig. 204
9	265-210306	Intercostal — Fwd	7075-T6 Clad	0.032	
10	265-210307	Intercostal — Intermediate	7075-T6 Clad	0.032	
11	265-210308	Intercostal — Aft	7075-T6 Clad	0.032	
12	265-210422	Doubler — Skin	7075-T6 Clad	0.063	
13	265-210417-3	Support — Inbd Hinge	7079-T6	Die Forge	
14	265-210402-1 & -2	Cap — Rear Beam	7075-T6 Bare	0.9375	
15	265-210418	Support Intermediate Hinge	7075-T6 Bar	0.8125	
16	265-210302	Beam — Rear	7075-T6 Bare	0.063	
17	265-210419	Support — Otbd Hinge	7075-T6 Extr	6E1104	
18	246-21105	Rib — Canted Sta 105.711	2024-T4 Clad	0.020	55-10-20 Fig. 204
19	265-210408-1 & -2	Stringer	7075-T6 Extr	4E756	55-10-20 Fig. 204
20	265-210098-21	Rib — Sta 98.480	7075-T6 Clad	0.050	55-10-20 Fig. 204
21	265-210091-5	Rib — Sta 91.424	2024-T42 Clad	0.040	55-10-20 Fig. 204
22	265-210084	Rib — Sta 84.368	2024-T42 Clad	0.040	55-10-20 Fig. 204
23	265-210077-5	Rib — Sta 77.312	2024-T42 Clad	0.050	55-10-20 Fig. 204
24	265-210070-3	Rib — Sta 70.256	2024-T42 Clad	0.050	55-10-20 Fig. 204
25	265-210063-5	Rib — Sta 63.200	2024-T42 Clad	0.050	55-10-20 Fig. 204
26	265-210056-21	Rib — Sta 56.362	2024-T42 Clad	0.063	55-10-20 Fig. 204
27	282-210026-41	Rib — LE, Sta 52.479	2024-T42 Clad	0.025	55-10-20 Fig. 204
28	265-210049-5	Rib — Sta 49.568	2024-T42 Clad	0.050	55-10-20 Fig. 204
29	282-210026-31	Rib — LE, Sta 45.914	2024-T42 Clad	0.025	55-10-20 Fig. 204
30	265-210042-5	Rib — Sta 42.991	2024-T42 Clad	0.050	55-10-20 Fig. 204
31	282-210026-21	Rib — LE, Sta 39.703	2024-T42 Clad	0.025	55-10-20 Fig. 204
32	265-210036-3	Rib — Sta 36.415	2024-T42 Clad	0.050	55-10-20 Fig. 204
33	282-210026-11	Rib — LE, Sta 33.127	2024-T42 Clad	0.025	55-10-20 Fig. 204
34	265-210029-9	Rib — Sta 29.839	2024-T42 Clad	0.050	55-10-20 Fig. 204
35	282-210026-1	Rib — LE, Sta 26.550	2024-T42 Clad	0.025	55-10-20 Fig. 204
36	265-210023	Rib — Sta 23.262	2024-T42 Clad	0.050	55-10-20 Fig. 204
37	265-210018	Rib — Sta 18.340	7075-T6 Clad	0.050	55-10-20 Fig. 204

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variations.***

Key to Figure 2



Horizontal Stabilizer Repair Index —
Model NA 265-65, -80, -80A, and -80SC
Figure 3

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-210002-19	Skin — Leading Edge	2024-T3 Clad	0.032	55-10-20 Fig. 201
2	265-210421-5	Skin — Upper	2024-T3 Bare	0.050 A	55-10-20 Fig. 202, 203
3	265-210421-6	Skin — Lower	2024-T3 Bare	0.050 A	55-10-20 Fig. 202
4	265-310311	Tip — Horizontal Stabilizer	6061-T4	0.025	
5	265-522097	Torque Tube — Interconnect	6061-T6 Tube	0.188 Wall	
6	380-210412-3	Beam — Center Section	7079-T652	Hand Forge	55-10-20 Fig. 205
7	380-210403-3 & -4	Support — Horizontal Stabilizer	7075-T6	Die Forge	
8	380-210010-3	Rib — Canted Sta 1.828	7075-T6 Clad	0.063	55-10-20 Fig. 204
9	380-210306-3	Intercostal — Fwd	7075-T6 Clad	0.032	
10	380-210307-3	Intercostal — Intermediate	7075-T6 Clad	0.032	
11	380-210308-3	Intercostal — Aft	7075-T6 Clad	0.032	
12	380-210422-3 & -4	Doubler — Skin	7075-T6 Clad	0.063	
13	380-210417-11	Support — Inbd Hinge	7079-T652	Hand Forge	
14	380-210402-3 & -4	Cap — Rear Beam	7075-T652 Bare	0.125	
15	265-210418	Support — Intermediate Hinge	7075-T6 Clad	1.375	
16	265-210302-11	Beam — Rear	7075-T6 Bare	0.063	
17	265-210419	Support — Otbd Hinge	7075-T6 Extr	6E1104	
18	246-21105	Rib — Canted Sta 105.711	2024-T42 Clad	0.020	
19	265-210408-3 & -4	Stringer	7075-T6Al Extr	4E756	
20	265-210098-21	Rib — Sta 98.480	2024-T42 Clad	0.050	55-10-20 Fig. 204
21	265-210091-5	Rib — Sta 91.424	2024-T42 Clad	0.040	55-10-20 Fig. 204
22	265-210084-5	Rib — Sta 84.368	2024-T42 Clad	0.040	55-10-20 Fig. 204
23	265-210077-5	Rib — Sta 77.312	2024-T42 Clad	0.050	55-10-20 Fig. 204
24	265-210070-5	Rib — Sta 70.256	2024-T42 Clad	0.050	55-10-20 Fig. 204
25	265-210063-5	Rib — Sta 63.200	2024-T42 Clad	0.050	55-10-20 Fig. 204
26	265-210056-21	Rib — Sta 56.362	2024-T42 Clad	0.063	55-10-20 Fig. 204
27	282-210026-41	Rib — LE, Sta 52.479	2024-T42 Clad	0.025	55-10-20 Fig. 204
28	265-210049-5	Rib — Sta 49.568	2024-T42 Clad	0.050	55-10-20 Fig. 204
29	282-210026-31	Rib — LE, Sta 45.914	2024-T42 Clad	0.025	55-10-20 Fig. 204
30	265-210042-5	Rib — LE, Sta 42.991	2024-T42 Clad	0.050	55-10-20 Fig. 204
31	282-210026-21	Rib — LE, Sta 39.703	2024-T42 Clad	0.025	55-10-20 Fig. 204
32	265-210036-3	Rib — Sta 36.415	2024-T42 Clad	0.050	55-10-20 Fig. 204
33	282-210026-11	Rib — LE, Sta 33.127	2024-T42 Clad	0.050	55-10-20 Fig. 204
34	262-210029-9	Rib — Sta 29.839	2024-T42 Clad	0.050	55-10-20 Fig. 204
35	282-210026-11	Rib — LE, Sta 26.550	2024-T42 Clad	0.025	55-10-20 Fig. 204
36	265-210023	Rib — Sta 23.262	2024-T42 Clad	0.050	55-10-20 Fig. 204
37	265-210018-11	Rib — LE, Sta 18.340	7075-T6 Clad	0.050	55-10-20 Fig. 204
38	380-210012-3	Rib — Canted Sta 12.503	7075-T6 Clad	0.050	55-10-20 Fig. 204
39	380-210011-3	Rib — Canted Sta 6.666	7075-T6 Clad	0.063	55-10-20 Fig. 204

NOTES

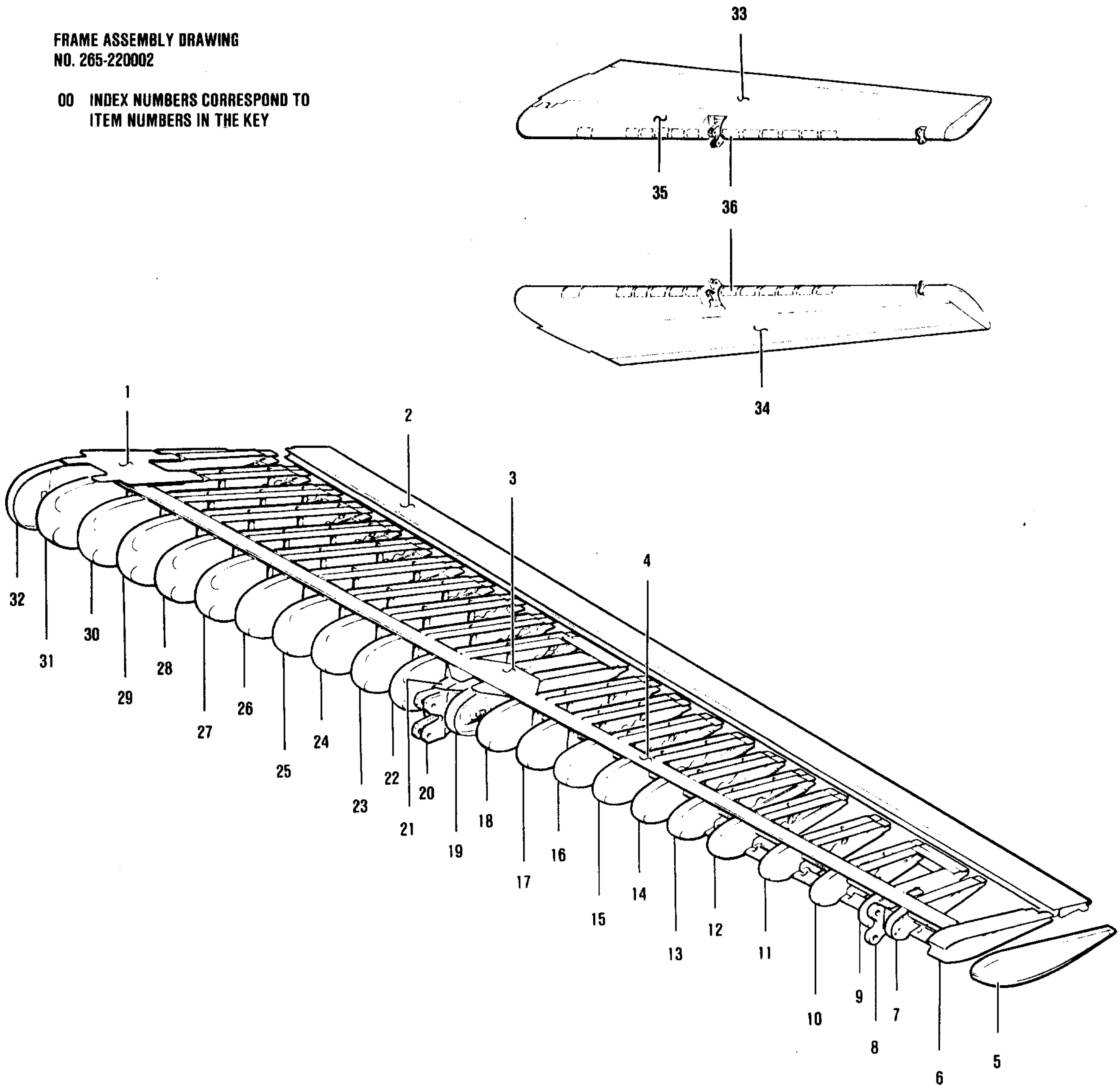
- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variations.*

Key to Figure 3

FRAME ASSEMBLY DRAWING
NO. 265-220002

00 INDEX NUMBERS CORRESPOND TO ITEM NUMBERS IN THE KEY



S265-3-184

Elevator Repair Index —
Model NA 265-40, -60, -60A, and -60SC
Figure 4

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-220205	Doubler — Skin	7075-T6 Clad	0.125 A	
2	246-22320	Beam — Elevator, TE			
	246-22320-3	Skin	2024-T3 Clad	0.010	
	246-22320-7	Core	5052-H39 Honeycomb	3/16x0.001	
3	265-220206	Doubler — Skin	7075-T6 Clad	0.063	
4	265-220411	Stringer	7075-T6 Extr	4E754	
5	246-22311	Tip	6061-T6	0.032	
6	265-220105	Rib — Elevator Canted Sta 105.711	2024-T42 Clad	0.020	
7	265-220099	Rib — Elevator Sta 99.281	2024-T42 Clad	0.040	
8	265-220419	Support — Outbd Hinge	7075-T6 Aly Bar	9/16x2.00	
9	265-220098	Rib — Elevator Sta 98.369	2024-T42 Clad	0.050	55-10-20 Fig. 206
10	265-220093	Rib — Elevator Sta 93.875	2024-T42 Clad	0.020	
11	265-220089	Rib — Elevator Sta 89.375	2024-T42 Clad	0.020	
12	265-220084	Rib — Elevator Sta 84.875	2024-T42 Clad	0.020	
13	265-220080	Rib — Elevator Sta 80.812	2024-T42 Clad	0.020	
14	265-220076	Rib — Elevator Sta 76.750	2024-T42 Clad	0.020	
15	265-220072	Rib — Elevator Sta 72.688	2024-T42 Clad	0.020	
16	265-220068	Rib — Elevator Sta 68.688	2024-T42 Clad	0.020	
17	265-220064	Rib — Elevator Sta 64.813	2024-T42 Clad	0.020	
18	265-220061	Rib — Elevator Sta 61.062	2024-T42 Clad	0.020	55-10-20 Fig. 206
19	265-220057	Rib — Elevator Sta 57.006	7075-T6 Clad	0.050	
20	265-220418	Support — Intermediate Hinge	7075-T6 Aly Bar	3/16x3	
21	265-220056	Rib — Elevator Sta 56.094	7075-T6 Clad	0.050	55-10-20 Fig. 206
22	265-220052	Rib — Elevator Sta 52.562	2024-T42 Clad	0.020	55-10-20 Fig. 206
23	265-220049	Rib — Elevator Sta 49.000	2024-T42 Clad	0.020	55-10-20 Fig. 206
24	265-220045	Rib — Elevator Sta 45.375	2024-T42 Clad	0.020	55-10-20 Fig. 206
25	265-220041	Rib — Elevator Sta 41.750	2024-T42 Clad	0.020	55-10-20 Fig. 206
26	265-220038	Rib — Elevator Sta 38.000	2024-T42 Clad	0.020	55-10-20 Fig. 206
27	265-220034	Rib — Elevator Sta 34.125	2024-T42 Clad	0.020	55-10-20 Fig. 206
28	265-220030	Rib — Elevator Sta 30.250	2024-T42 Clad	0.020	55-10-20 Fig. 206
29	265-220026	Rib — Elevator Sta 26.250	2024-T42 Clad	0.020	55-10-20 Fig. 206
30	265-220022	Rib — Elevator Sta 22.250	2024-T42 Clad	0.020	55-10-20 Fig. 206
31	265-220018	Rib — Elevator Sta 18.250	7075-T6 Clad	0.050	55-10-20 Fig. 206
32	265-220013	Rib — Elevator Sta 13.547	7075-T6 Clad	0.040	55-10-20 Fig. 206
33	265-220420-1	Skin — Elevator, Upper	2024-T3 Bare	0.032 A	
34	265-220420-2	Skin — Elevator, Lower	2024-T3 Bare	0.032 A	
35	265-220002-3	Skin — Elevator, LE	2024-T3	0.032	55-10-20 Fig. 212
36	265-220416-3, -5, -7, -9, -11, -13, and -15	Weight — Balance	1018 Steel Bar	0.032	55-10-20 Fig. 207

NOTES

- *For additional repairs, refer to 51-70-00.*

A *This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variations.*

Key to Figure 4
Model NA 265-40, (S/N 282-1 thru -53)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-220205	Doubler — Skin	7075-T6 Clad	0.125 A	
2	246-22320	Beam — Elevator, TE			
	246-22320-3	Skin	2024-T3 Clad	0.010	
	246-22320-7	Core	5052-H39 Honeycomb	3/16x0.001	
3	265-220206	Doubler — Skin	7075-T6 Clad	0.063	
4	265-220411	Stringer	7075-T6 Extr	4E754	
5	246-22311	Tip	6061-T6	0.032	
6	265-220105	Rib — Elevator Canted Sta 105.711	2024-T42 Clad	0.020	
7	265-220099	Rib — Elevator Sta 99.281	2024-T42 Clad	0.040	
8	265-220419	Support — Outbd Hinge	7075-T6 Aly Bar	9/16x2.00	
9	265-220098	Rib — Elevator Sta 98.369	2024-T42 Clad	0.050	55-10-20 Fig. 206
10	265-220093	Rib — Elevator Sta 93.875	2024-T24 Clad	0.025	55-10-20 Fig. 206
11	265-220089	Rib — Elevator Sta 89.375	2024-T42 Clad	0.025	55-10-20 Fig. 206
12	265-220084	Rib — Elevator Sta 84.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
13	265-220080	Rib — Elevator Sta 80.812	2024-T42 Clad	0.025	55-10-20 Fig. 206
14	265-220076	Rib — Elevator Sta 76.750	2024-T42 Clad	0.025	55-10-20 Fig. 206
15	265-220072	Rib — Elevator Sta 72.688	2024-T42 Clad	0.025	55-10-20 Fig. 206
16	265-220068	Rib — Elevator Sta 68.688	2024-T42 Clad	0.025	55-10-20 Fig. 206
17	265-220064	Rib — Elevator Sta 64.813	2024-T42 Clad	0.025	55-10-20 Fig. 206
18	265-220061	Rib — Elevator Sta 61.062	2024-T42 Clad	0.025	55-10-20 Fig. 206
19	265-220057	Rib — Elevator Sta 57.006	7075-T6 Clad	0.050	
20	265-220418	Support — Intermediate Hinge	7075-T6 Aly Bar	3/16x3	
21	265-220056	Rib — Elevator Sta 56.094	7075-T6 Clad	0.050	55-10-20 Fig. 206
22	265-220052	Rib — Elevator Sta 52.562	2024-T42 Clad	0.025	55-10-20 Fig. 206
23	265-220049	Rib — Elevator Sta 49.000	2024-T42 Clad	0.025	55-10-20 Fig. 206
24	265-220045	Rib — Elevator Sta 45.375	2024-T42 Clad	0.025	55-10-20 Fig. 206
25	265-220041	Rib — Elevator Sta 41.750	2024-T42 Clad	0.025	55-10-20 Fig. 206
26	265-220038	Rib — Elevator Sta 38.000	2024-T42 Clad	0.025	55-10-20 Fig. 206
27	265-220034	Rib — Elevator Sta 34.125	2024-T42 Clad	0.025	55-10-20 Fig. 206
28	265-220030	Rib — Elevator Sta 30.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
29	265-220026	Rib — Elevator Sta 26.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
30	265-220022	Rib — Elevator Sta 22.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
31	265-220018	Rib — Elevator Sta 18.250	7075-T6 Clad	0.025	55-10-20 Fig. 206
32	265-220013	Rib — Elevator Sta 13.547	7075-T6 Clad	0.020	
33	265-220420-1	Skin — Elevator, Upper	2024-T3 Bare	0.032 A	
34	265-220420-2	Skin — Elevator, Lower	2024-T3 Bare	0.032 A	
35	265-220002-3	Skin — Elevator, LE	2024-T3	0.032	55-10-20 Fig. 212
36	265-220416-3, -5, -7, -9, -11, -13, and -15	Weight — Balance	1018 Steel Bar	0.032	55-10-20 Fig. 207

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variations.***

Key to Figure 4
Model NA 265-40, (S/N 282-54 thru -90)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-220205	Doubler — Skin	7075-T6 Clad	0.125 A	
2	246-22320	Beam — Elevator, TE			
	246-22320-3	Skin	2024-T3 Clad	0.010	
	246-22320-7	Core	5052-H39 Honeycomb	3/16x0.001	
3	265-220206	Doubler — Skin	7075-T6 Clad	0.063	
4	265-220411	Stringer	7075-T6 Extr	4E754	
5	246-22311	Tip	6061-T6	0.032	
6	265-220105	Rib — Elevator Canted Sta 105.711	2024-T42 Clad	0.020	
7	265-220099	Rib — Elevator Sta 99.281	2024-T42 Clad	0.040	
8	265-220419	Support — Outbd Hinge	7075-T6 Aly Bar	9/16x2.00	
9	265-220098	Rib — Elevator Sta 98.369	2024-T42 Clad	0.050	55-10-20 Fig. 206
10	265-220093	Rib — Elevator Sta 93.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
11	265-220089	Rib — Elevator Sta 89.375	2024-T42 Clad	0.025	55-10-20 Fig. 206
12	265-220084	Rib — Elevator Sta 84.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
13	265-220080	Rib — Elevator Sta 80.812	2024-T42 Clad	0.025	55-10-20 Fig. 206
14	265-220076	Rib — Elevator Sta 76.750	2024-T42 Clad	0.032	55-10-20 Fig. 206
15	265-220072	Rib — Elevator Sta 72.688	2024-T42 Clad	0.032	55-10-20 Fig. 206
16	265-220068	Rib — Elevator Sta 68.688	2024-T42 Clad	0.032	55-10-20 Fig. 206
17	265-220064	Rib — Elevator Sta 64.813	2024-T42 Clad	0.032	55-10-20 Fig. 206
18	265-220061	Rib — Elevator Sta 61.062	2024-T42 Clad	0.032	55-10-20 Fig. 206
19	265-220057	Rib — Elevator Sta 57.006	7075-T6 Clad	0.050	
20	265-220418	Support — Intermediate Hinge	7075-T6 Aly Bar	13/16x3	
21	265-220056	Rib — Elevator Sta 56.094	7075-T6 Clad	0.050	55-10-20 Fig. 206
22	265-220052	Rib — Elevator Sta 52.562	2024-T42 Clad	0.032	55-10-20 Fig. 206
23	265-220049	Rib — Elevator Sta 49.000	2024-T42 Clad	0.032	55-10-20 Fig. 206
24	265-220045	Rib — Elevator Sta 45.375	2024-T42 Clad	0.032	55-10-20 Fig. 206
25	265-220041	Rib — Elevator Sta 41.750	2024-T42 Clad	0.032	55-10-20 Fig. 206
26	265-220038	Rib — Elevator Sta 38.000	2024-T42 Clad	0.032	55-10-20 Fig. 206
27	265-220034	Rib — Elevator Sta 34.125	2024-T42 Clad	0.032	55-10-20 Fig. 206
28	265-220030	Rib — Elevator Sta 30.250	2024-T42 Clad	0.032	55-10-20 Fig. 206
29	265-220026	Rib — Elevator Sta 26.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
30	265-220022	Rib — Elevator Sta 22.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
31	265-220018	Rib — Elevator Sta 18.250	7075-T6 Clad	0.025	55-10-20 Fig. 206
32	265-220013	Rib — Elevator Sta 13.547	7075-T6 Clad	0.025	
33	265-220420-1	Skin — Elevator, Upper	2024-T3 Bare	0.032 A	
34	265-220420-2	Skin — Elevator, Lower	2024-T3 Bare	0.032 A	
35	265-220002-3	Skin — Elevator, LE	2024-T3	0.032	55-10-20 Fig. 212
36	265-220416-3, -5, -7, -9, -11, -13, and -15	Weight — Balance	1018 Steel Bar	0.032	55-10-20 Fig. 207

NOTES

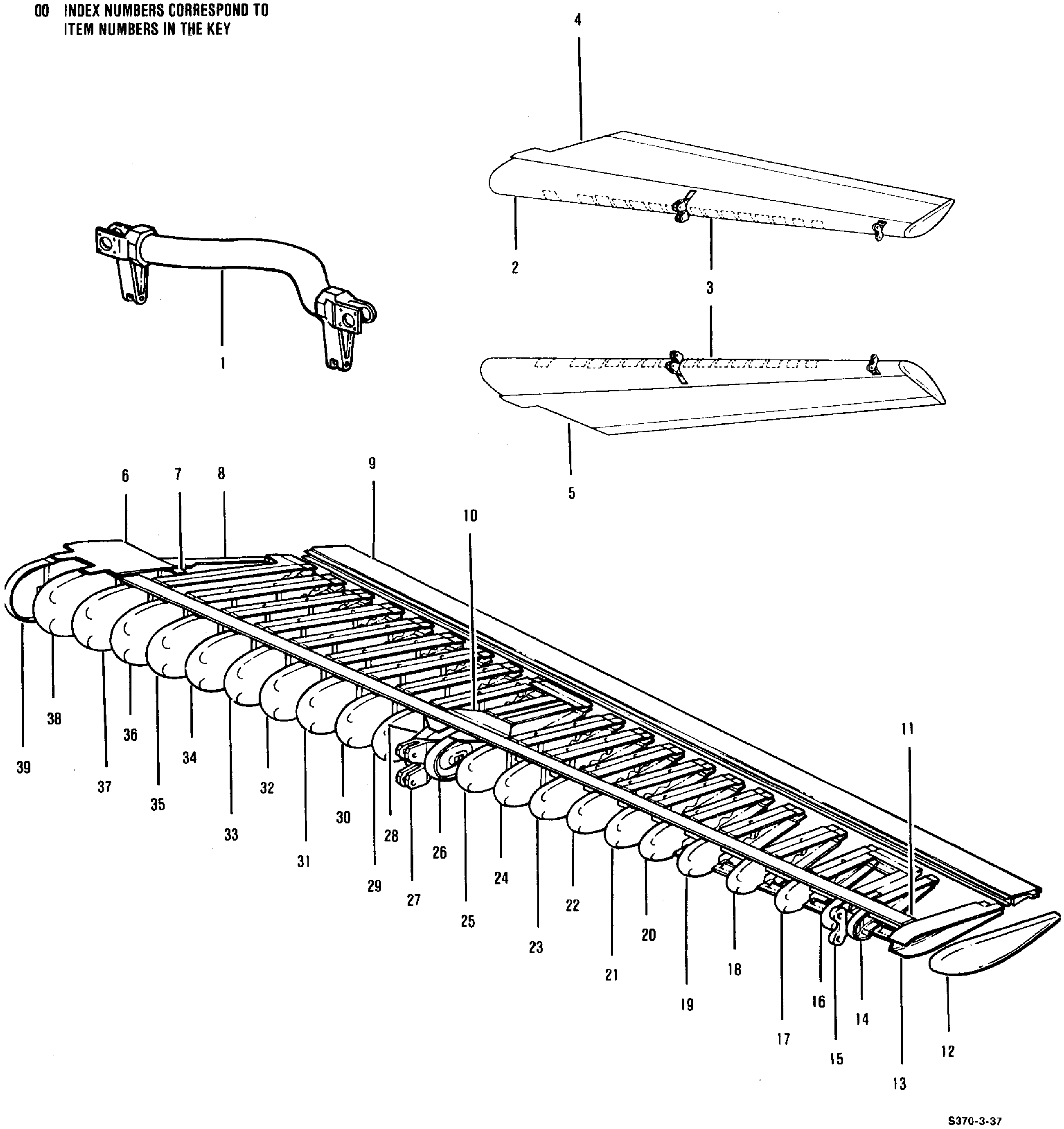
- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variations.***

Key to Figure 4
Model NA 265-40, (S/N 282-1 thru -53, changed by S/L 66-10, 282-91 and Subs), -60, -60A, and -60SC

FRAME ASSEMBLY
DRAWING NO. 265-220002

00 INDEX NUMBERS CORRESPOND TO
ITEM NUMBERS IN THE KEY



Elevator Repair Index — Model NA 265-70
Figure 5

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-220405	Torque Tube — Elevator	2024-T4 Tube	0.109 Wall	
2	265-220002-17	Skin — Elevator LE	2024-T42 Bare	0.050	55-10-20 Fig. 212
3	265-220416	Weight — Balance	1018-Steel Bar		
4	265-220420-5	Skin — Elevator, Upper	2024-T3 Bare	0.032 A	
5	265-220420-6	Skin — Elevator, Lower	2024-T3 Bare	0.032 A	
6	370-220205-1	Doubler — Skin	7075-T6 Clad	0.125	
7	370-220250-3	Beam — Elevator — Inbd	17-7PH CRES	0.063	
8	370-220256	Rib — Elevator — Canted, Inbd	2024-T42 Clad	0.040	55-10-20 Fig. 206
9	246-22320-41	Trailing Edge — Elevator			
	246-22320-25	Skin	2024-T3 Clad	0.010	55-10-20 Fig. 204
	246-22320-27	Honeycomb Core	5052-H39 Al	3/16 x 0.001	55-10-20 Fig. 203
10	265-220206-3	Doubler — Skin	4130 Steel Sht.	0.050	
11	265-220411-1 & -2	Stringer	7075-T6 Al Extr	4E754	
12	246-22311	Tip — Elevator	6061-T-6	0.032	
13	265-220105-21	Rib — Elevator Sta 105.711	2024-T42 Clad	0.020 A	55-10-20 Fig. 206
14	265-220099	Rib — Elevator Sta 99.281	2024-T42 Clad	0.040	55-10-20 Fig. 206
15	265-220429-3	Support — Otbd Hinge	7075-T6 Al Bar	0.500	55-10-20 Fig. 208
16	265-220098	Rib — Elevator Sta 98.369	2024-T42 Clad	0.050	55-10-20 Fig. 206
17	265-220093-31	Rib — Elevator Sta 93.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
18	265-22089-31	Rib — Elevator Sta 89.375	2024-T42 Clad	0.025	55-10-20 Fig. 206
19	265-220084-31	Rib — Elevator Sta 84.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
20	265-220080-31	Rib — Elevator Sta 80.812	2024-T42 Clad	0.025	55-10-20 Fig. 206
21	265-220076-31	Rib — Elevator Sta 76.750	2024-T42 Clad	0.025	55-10-20 Fig. 206
22	265-220072-41	Rib — Elevator Sta 72.688	2024-T42 Clad	0.032	55-10-20 Fig. 206
23	265-220068-41	Rib — Elevator Sta 68.688	2024-T42 Clad	0.032	55-10-20 Fig. 206
24	265-220064-41	Rib — Elevator Sta 64.813	2024-T42 Clad	0.032	55-10-20 Fig. 206
25	265-220061-41	Rib — Elevator Sta 61.062	2024-T42 Clad	0.032	55-10-20 Fig. 206
26	265-220057-11	Rib — Elevator Sta 57.006	7075-T6 Clad	0.050	55-10-20 Fig. 206
27	285-220418-3	Support — Intermediate Hinge	7075-T6 Al	Die Forge	55-10-20 Fig. 208
28	265-220056	Rib — Elevator Sta 56.094	7075-T6 Clad	0.050	55-10-20 Fig. 206
29	265-220052-41	Rib — Elevator Sta 52.562	2024-T42 Clad	0.032	55-10-20 Fig. 206
30	265-220049-41	Rib — Elevator Sta 49.000	2024-T42 Clad	0.032	55-10-20 Fig. 206
31	265-220045-41	Rib — Elevator Sta 45.375	2024-T42 Clad	0.032	55-10-20 Fig. 206
32	265-220041-41	Rib — Elevator Sta 41.750	2024-T42 Clad	0.032	55-10-20 Fig. 206
33	265-220038-41	Rib — Elevator Sta 38.000	2024-T42 Clad	0.032	55-10-20 Fig. 206
34	265-220034-41	Rib — Elevator Sta 34.125	2024-T42 Clad	0.032	55-10-20 Fig. 206
35	265-220030-41	Rib — Elevator Sta 30.250	2024-T42 Clad	0.032	55-10-20 Fig. 206
36	265-220026-31	Rib — Elevator Sta 26.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
37	370-220022-11	Rib — Elevator Sta 22.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
38	370-220018-11	Rib — Elevator Sta 18.250	7075-T6 Clad	0.020	55-10-20 Fig. 206
39	370-220013-11	Rib — Elevator Sta 13.547	7075-T6 Clad	0.040	55-10-20 Fig. 206

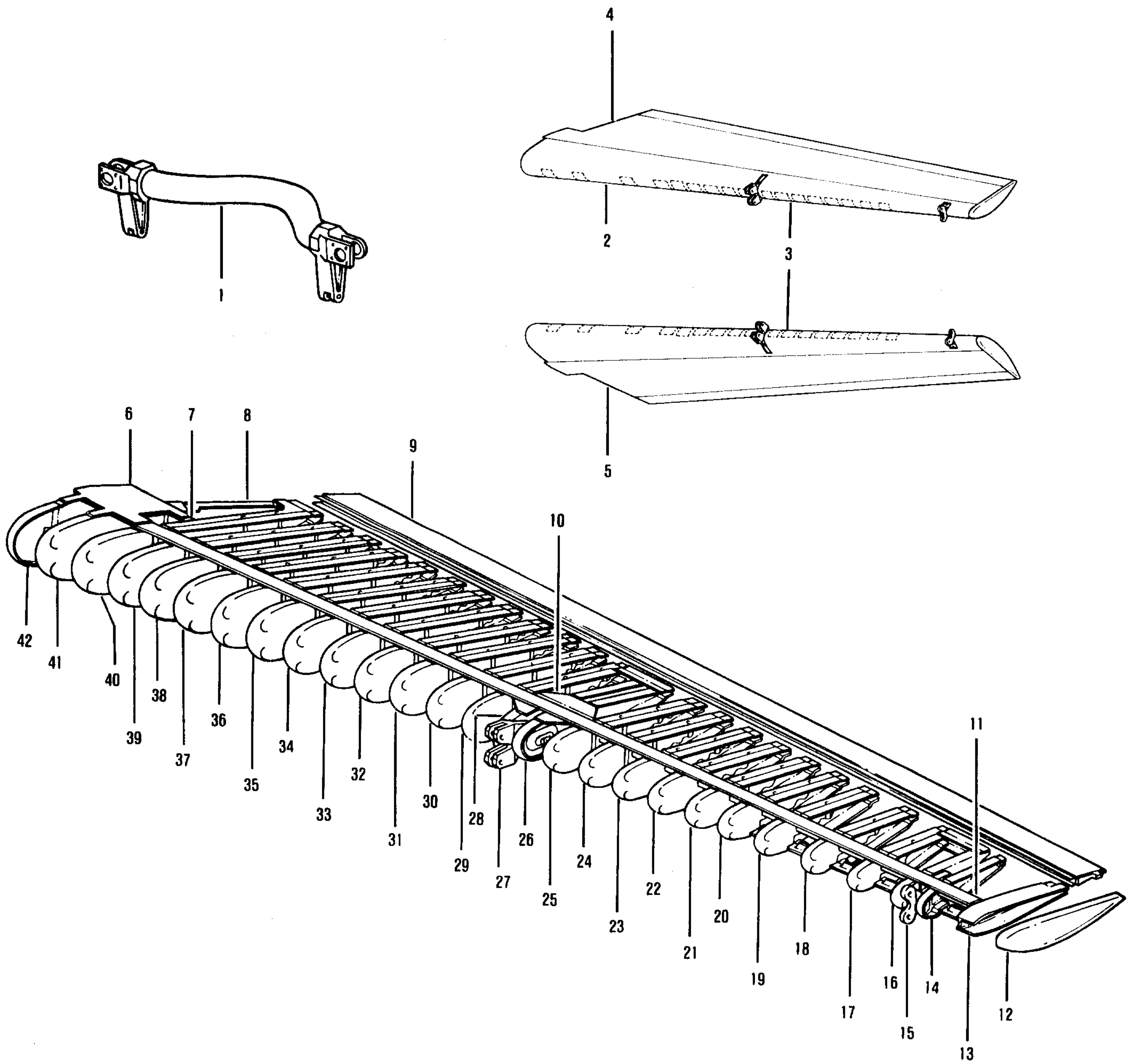
NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variations.***

Key to Figure 5
Model NA 265-70

00 INDEX NUMBERS CORRESPOND TO
THE ITEM NUMBERS IN THE KEY



Elevator Repair Index — Model NA 265-65, -80, -80A, and -80SC
Figure 6

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-220006	Torque Tube — Elevator	2024-T4 Tube	0.109 WO11	
2	265-220002-43	Skin — Elevator LE	2024-T42 Bare	0.050	55-10-20 Fig. 212
3	265-220416	Weight — Balance	1018-Steel Bar		
4	265-220420-7	Skin — Elevator, Upper	2024-T3 Bare	0.032 A	
5	265-220420-8	Skin — Elevator, Lower	2024-T3 Bare	0.032 A	
6	330-220016-1 &- 2	Doubler — Skin	7075-T6 Clad	0.032	
7	380-220250-3	Beam — Elevator, Inbd	17-7PH CRES	0.063	
8	380-220014-3	Rib — Elevator, Canted, Inbd	2024-T42 Clad	0.040	55-10-20 Fig. 206
9	380-220320-11 & -21	Trailing Edge, Elevator			
	380-220320-3	Skin	2024-T3 Clad	0.010	
	380-220320-7	Honeycomb Core	5052-H39	3/16 x 0.010	51-70-50 Fig. 203
10	265-220206-3	Doubler — Skin	4130 Steel Sht.	0.050	
11	265-220411-3 & -4	Stringer	7075-T6 Al Extr	4E754	
12	246-22311	Tip — Elevator	6061-T6 Forging	0.032	
13	265-220105-21	Rib — Elevator Sta 105.711	2024-T42 Clad	0.020	55-10-20 Fig. 206
14	265-220099	Rib — Elevator Sta 99.281	2024-T42 Clad	0.040	55-10-20 Fig. 206
15	265-220429-3	Support — Outbd Hinge	7075-T6 Al Bar	0.500	55-10-20 Fig. 208
16	265-220098	Rib — Elevator Sta 98.369	2024-T42 Clad	0.050	55-10-20 Fig. 206
17	265-220093-31	Rib — Elevator Sta 93.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
18	265-220089-31	Rib — Elevator Sta 89.375	2024-T42 Clad	0.025	55-10-20 Fig. 206
19	265-220084-31	Rib — Elevator Sta 84.875	2024-T42 Clad	0.025	55-10-20 Fig. 206
20	265-220080-31	Rib — Elevator Sta 80.812	2024-T42 Clad	0.025	55-10-20 Fig. 206
21	265-220076-31	Rib — Elevator Sta 76.750	2024-T42 Clad	0.025	55-10-20 Fig. 206
22	265-220072-41	Rib — Elevator Sta 72.688	2024-T42 Clad	0.032	55-10-20 Fig. 206
23	265-220068-41	Rib — Elevator Sta 68.688	2024-T42 Clad	0.032	55-10-20 Fig. 206
24	265-220064-41	Rib — Elevator Sta 64.813	2024-T42 Clad	0.032	55-10-20 Fig. 206
25	265-220061-41	Rib — Elevator Sta 61.062	2024-T42 Clad	0.032	55-10-20 Fig. 206
26	265-220057-11	Rib — Elevator Sta 57.006	7075-T6 Clad	0.050	55-10-20 Fig. 206
27	285-220418-3	Support — Intermediate Hinge	7075-T6 A1	Die Forge	55-10-20 Fig. 208
28	265-220056	Rib — Elevator Sta 56.094	7075-T6 Clad	0.050	55-10-20 Fig. 206
29	265-220052-41	Rib — Elevator Sta 52.562	2024-T42 Clad	0.032	55-10-20 Fig. 206
30	265-220049-41	Rib — Elevator Sta 49.000	2024-T42 Clad	0.032	55-10-20 Fig. 206
31	265-220045-41	Rib — Elevator Sta 45.375	2024-T42 Clad	0.032	55-10-20 Fig. 206
32	265-220041-41	Rib — Elevator Sta 41.750	2024-T42 Clad	0.032	55-10-20 Fig. 206
33	265-220038-41	Rib — Elevator Sta 38.000	2024-T42 Clad	0.032	55-10-20 Fig. 206
34	265-220034-41	Rib — Elevator Sta 34.125	2024-T42 Clad	0.032	55-10-20 Fig. 206
35	265-220030-51	Rib — Elevator Sta 30.250	2024-T42 Clad	0.032	55-10-20 Fig. 206
36	265-220026-41	Rib — Elevator Sta 26.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
37	380-220022-11	Rib — Elevator Sta 22.250	2024-T42 Clad	0.025	55-10-20 Fig. 206
38	380-220018-11	Rib — Elevator Sta 18.540	7075-T6 Clad	0.025	55-10-20 Fig. 206
39	380-220010-11	Rib — Elevator Sta 14.830	7075-T6 Clad	0.025	55-10-20 Fig. 206
40	380-220011-11	Rib — Elevator Sta 11.120	2024-T42 Clad	0.025	55-10-20 Fig. 206
41	380-220012-11	Rib — Elevator Sta 6.744	7075-T6 Clad	0.020	55-10-20 Fig. 206
42	380-220013-11	Rib — Elevator Sta 2.120	7075-T6 Clad	0.040	55-10-20 Fig. 206

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variation.***

Key to Figure 6

HORIZONTAL STABILIZERS

REPAIR

GENERAL

This section contains repairs for the horizontal stabilizer. For applicability of repairs, refer to 55-00-00.

ELEVATOR STATIC BALANCING

When a repair is done on the elevator it is necessary that the surface be static balance checked. All repaired elevators must be rebalanced. The procedure for balancing elevators is given on page 227. The procedure for the addition of weights is given in figures 209 thru 212.

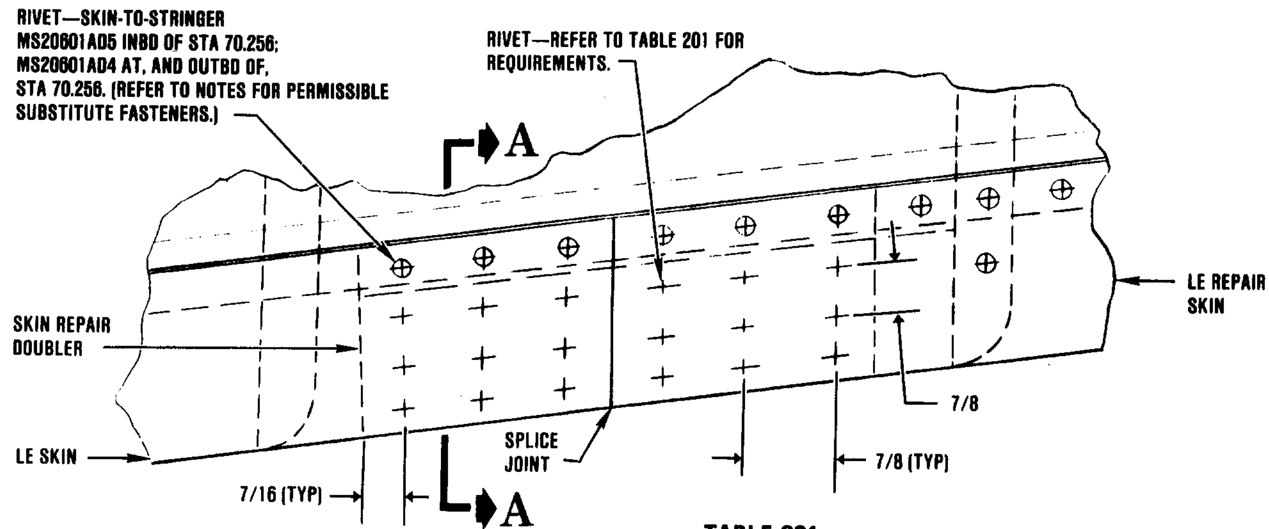
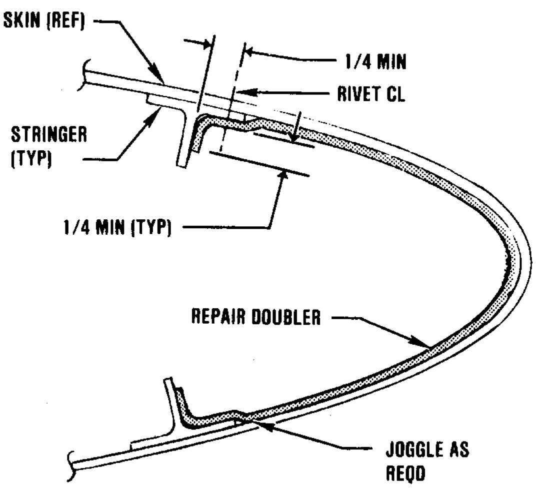
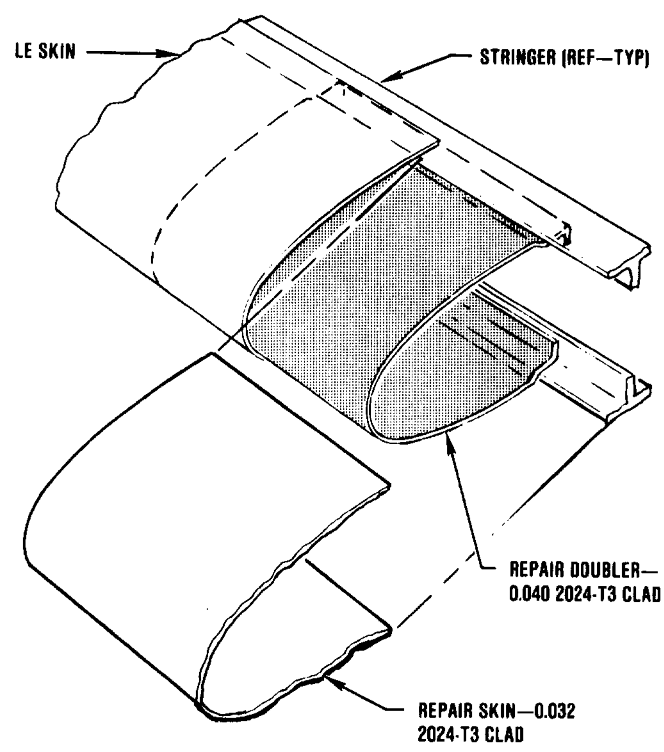


TABLE 201

SKIN-TO-REPAIR-DOUBLER RIVETING	
FASTENER	NO. OF ROWS REQD
MS20426AD5	2
CR2248-5	3
F164 JO-BOLT	3
DIMPLE SKINS—CSK REPAIR DOUBLER	



SECTION A-A (ROTATED)



1 Trim damage midway between existing fasteners.

2 Fabricate repair doubler (or doublers) and repair skin section.

3 Install repair parts as shown.

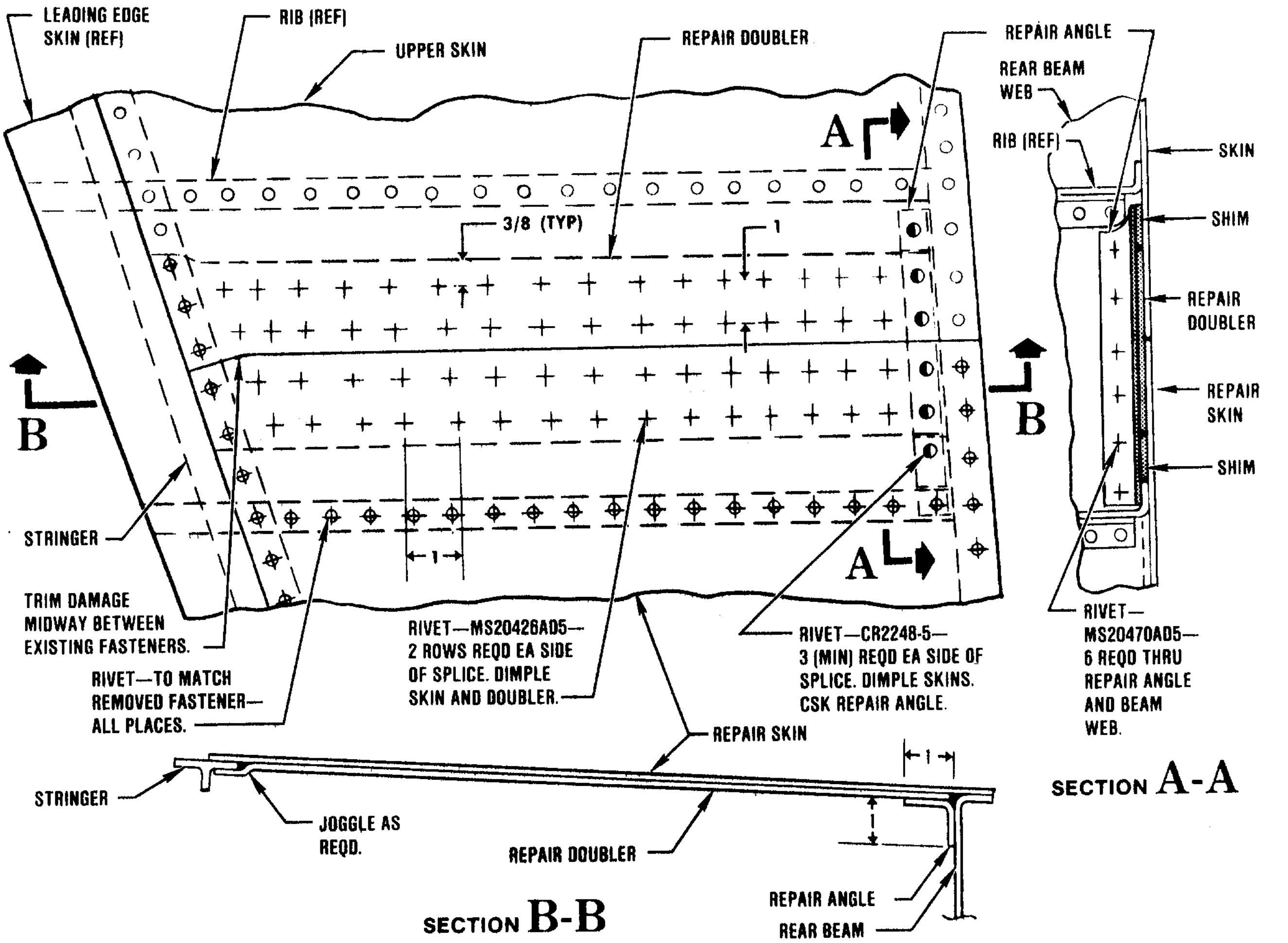
4 Refinish repair to match surrounding areas.

NOTES

- THIS REPAIR IS APPLICABLE TO ALL AREAS OF THE HORIZONTAL STABILIZER LEADING EDGE.
- A COMPLETE SKIN SPLICE IS SHOWN; HOWEVER, ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER MAY BE MADE, USING THE REPAIR DATA GIVEN.
- CR178 OR CR2248 RIVETS MAY BE SUBSTITUTED, SIZE FOR SIZE, FOR THE RIVET CALLED OUT FOR SKIN-TO-STRINGER RIVETING.

S265-3-196

Horizontal Stabilizer Leading Edge Skin Repairs
Figure 201



1 Remove close-out skin fasteners as required.

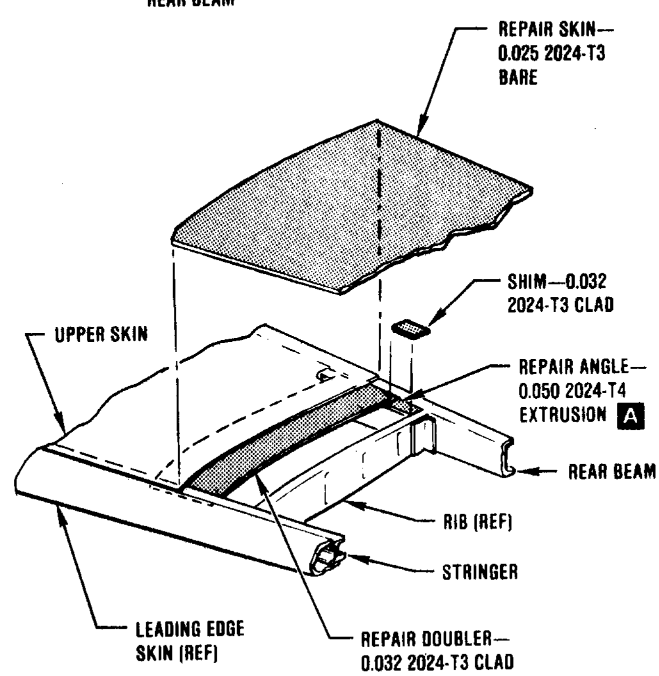
2 Trim off damaged skin.

3 Fabricate repair parts.

4 Prime repair parts.

5 Install repair parts and replace close-out skin-fasteners as applicable.

6 Refinish repair to match surrounding areas.



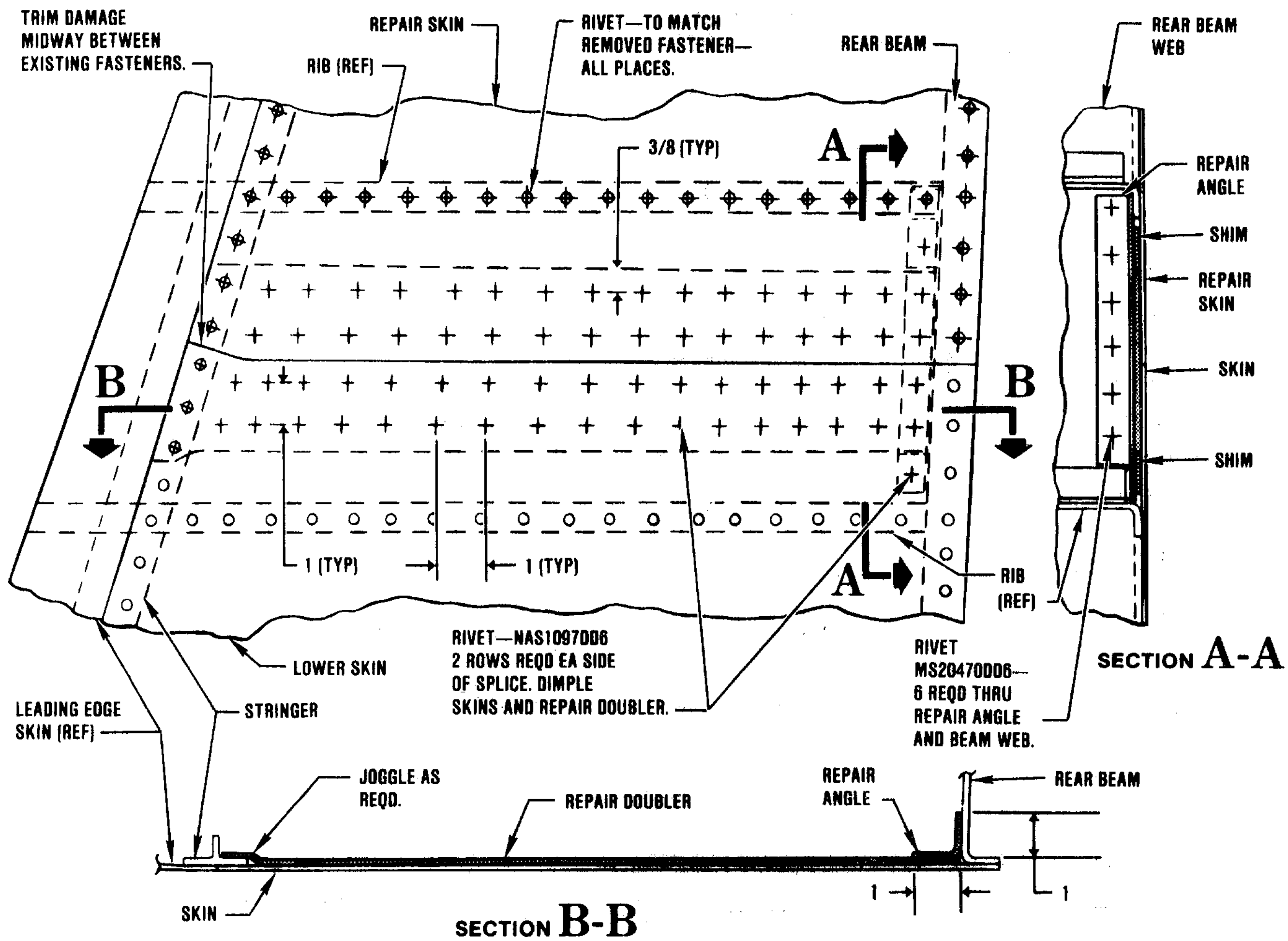
NOTES

- THIS REPAIR IS APPLCIABLE TO THE HORIZONTAL STABILIZER UPPER SKIN OUTBD OF STATION 70.256
- ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER CAN BE MADE, USING THE DATA PRESENTED. SMALLER REPAIRS ARE NOT LIMITED TO AREAS OUTBD OF STATION 70.256. THEY ARE, HOWEVER, LIMITED TO AREAS WHERE THE SKIN IS 0.025 IN., CONSTANT.

A REPAIR ANGLE MAY BE MADE FROM 0.050 IN. 2024-O, HEAT-TREATED TO THE -T4 CONDITION AFTER FORMING.

S265-3-197

Horizontal Stabilizer Upper and Lower Skin Repairs
Figure 202 (Sheet 1 of 2)



1 Remove close-out (upper) skin fasteners as necessary for access.

2 Trim off damaged skin.

3 Fabricate repair parts.

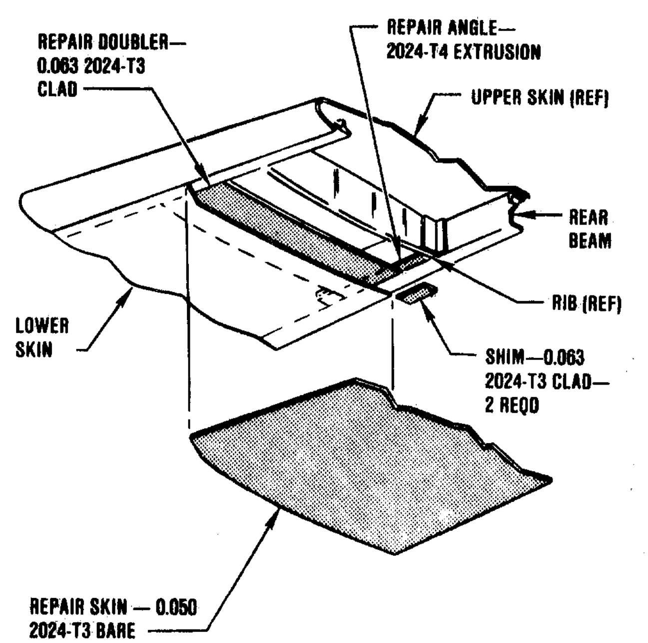
4 Prime repair parts.

5 Install repair parts and replace close-out skin-fasteners as applicable.

6 Refinish repair to match surrounding areas.

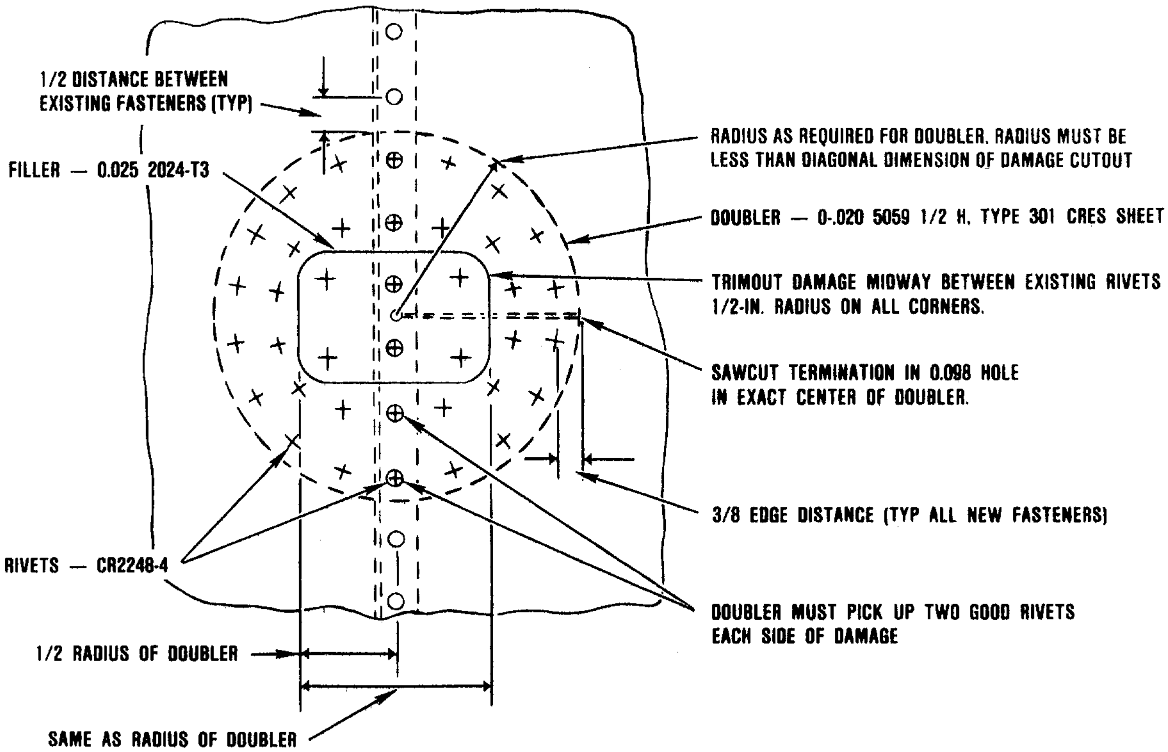
NOTES

- THIS REPAIR IS APPLICABLE TO THE HORIZONTAL STABILIZER LOWER SKIN OUTBD OF STATION 56.144
- ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER CAN BE MADE, USING THE DATA PRESENTED.



8265-3-198

Horizontal Stabilizer Upper and Lower Skin Repairs
Figure 202 (Sheet 2 of 2)

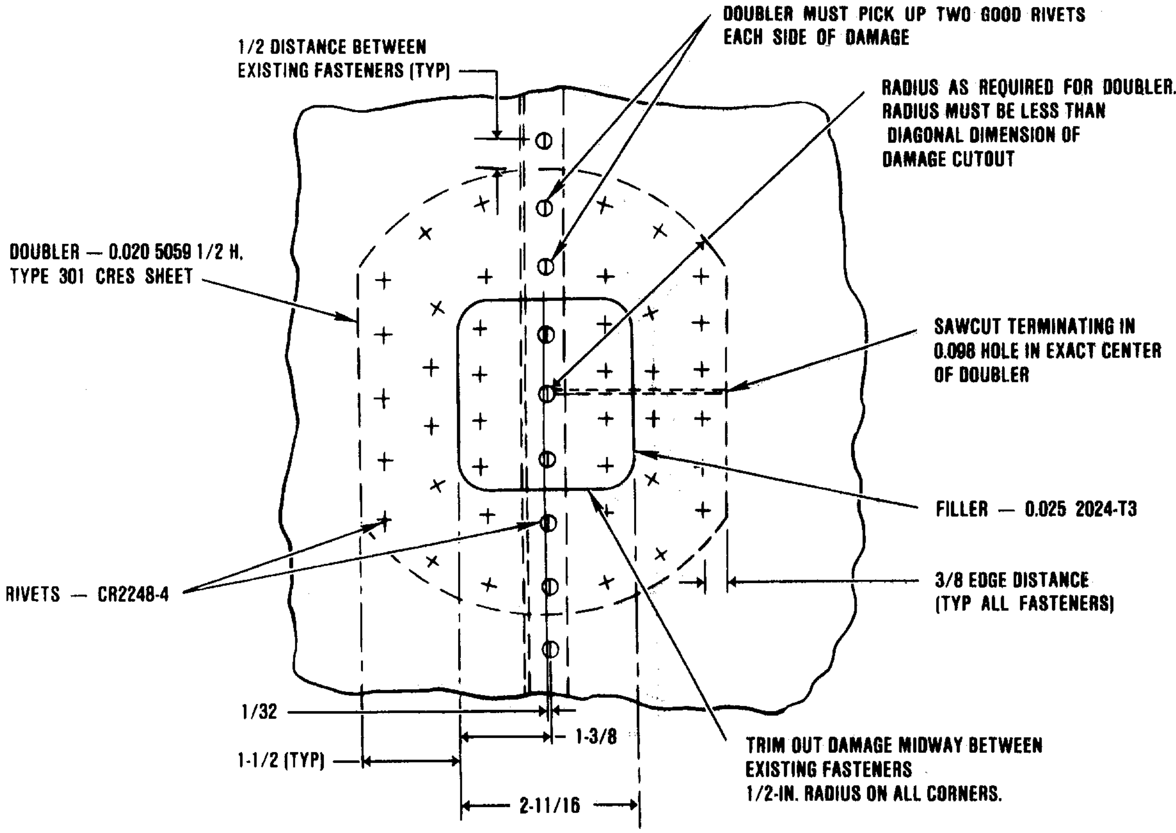


REPAIRING ONE CRACKED DIMPLE OR TWO CRACKED DIMPLES IN SUCCESSION FOR MS20426AD4 RIVETS ATTACHING RIBS BWETWEEN FWD STRINGER AND REAR SPAR IN CONSTANT-GAUGE SKINS

1. Fabricate doubler to dimensions given.
2. Saw-cut doubler as shown to allow installation through skin cutout.
3. Remove existing rivets that will be picked up by doubler.
4. Position doubler over damaged holes. Drill holes in doubler to match existing rivet locations.
5. Lay out and pilot-drill added rivet holes through doubler only.
6. Using doubler as a guide, drill through added rivet holes in doubler to locate rivet holes in skin.
7. Cut out damaged area of skin to size shown.
8. Fabricate filler to match size of damage cutout. Skin gap tolerance between filler and skin is 0 to 1/16 in.
9. Position filler in damage cutout and pick up existing rivet holes in rib.
10. Temporarily attach filler to doubler, using existing rivet hole locations. Lay out and pilot-drill rivet locations through filler and doubler.
11. Dimple skin, doubler, and filler for CR2248-4 rivets. To dimple skin, use draw-dimpling method.
12. Prime all repair parts with epoxy polyamide primer.
13. Install doubler between rib and skin, using saw cut to "spiral" doubler in position. Remove additional rivets through skin and rib if required to install doubler.
14. Install CR2248-4 rivets through skin and doubler.
15. Install filler, using CR2248-4 rivets through filler and doubler and through filler and rib.
16. Refinish repair to match surrounding area.

S370-3-61A

Repairing Cracked Dimples in Horizontal Stabilizer Upper Skins
Figure 203 (Sheet 1 of 4)



REPAIRING THREE SUCCESSIVE CRACKED DIMPLES FOR MS20426AD4 RIVETS BETWEEN FWD STRINGER AND REAR SPAR IN CONSTANT-GAGE SKINS

1 Fabricate doubler to dimensions given.

2 Saw-cut doubler as shown to allow installation through skin cutout.

3 Remove existing rivets that will be picked up by doubler.

4 Position doubler over damaged holes. The 0.098-in. saw-cut terminating hole should be centered over the middle damaged hole. Drill holes in doubler to match existing rivet locations.

5 Lay out and pilot-drill added rivet holes through doubler.

6 Using doubler as a guide, drill through added rivet holes in doubler to locate rivet holes in skin.

7 Cut out damaged area of skin to size shown.

8 Fabricate filler to match size of damage cutout. Skin gap tolerance between plug and skin is 0 to 1/16 in.

NOTE

IF MORE THAN THREE DIMPLES ARE CRACKED IN A ROW, USE STANDARD CONSTANT—GAGE SKIN REPAIR.

9 Position plug in damage cutout and pick up existing rivet holes in rib.

10 Temporarily attach filler to doubler, using the three existing rivet hole locations. Lay out and pilot-drill added rivet locations through filler and doubler.

11 Dimple skin, doubler, and filler for CR2248-4 rivets. To dimple skin, use draw-dimpling method.

12 Prime all repair parts with epoxy polyamide primer.

13 Install doubler between rib and skin, using saw cut to "spiral" doubler in position. Remove additional rivets through skin and rib if required to install doubler.

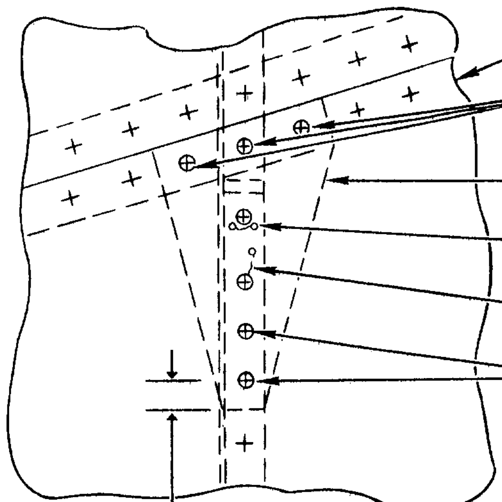
14 Install CR2248-4 rivets through skin and doubler.

15 Install filler, using CR2248-4 rivets through filler and doubler and through filler and rib.

16 Refinish repair to match surrounding area.

S370-3-62A

Repairing Cracked Dimples in Horizontal Stabilizer Upper Skins
Figure 203 (Sheet 2 of 4)



LEGEND

⊕ INDICATES CR2248-4 RIVETS

⊕ INDICATES CR2248-5 RIVETS

REPAIR OF ONE RADIALLY CRACKED DIMPLE OR TWO CIRCUMFERENTIALLY CRACKED DIMPLES FOR MS20426AD4 RIVETS AT RIB INTERSECTION WITH FWD STRINGER IN CONSTANT-GAGE SKIN

1 Stop-drill all cracks with a No. 40 (0.098-in.) drill.

2 Fabricate doubler to approximate size. Doubler must pick up two good existing fasteners on aft end of doubler and three good existing fasteners on fwd edge of doubler along stringer.

3 Remove all fasteners to be picked up by doubler.

4 Slide doubler in place between damaged skin and rib.

5 Drill through existing fastener locations to locate fastener holes in doubler.

6 Remove doubler and dimple fastener holes in doubler to match existing fastener dimple diameters. Trim to correct size, allowing 3/8-in. edge distance on all fasteners.

7 Prime doubler with epoxy polyamide primer.

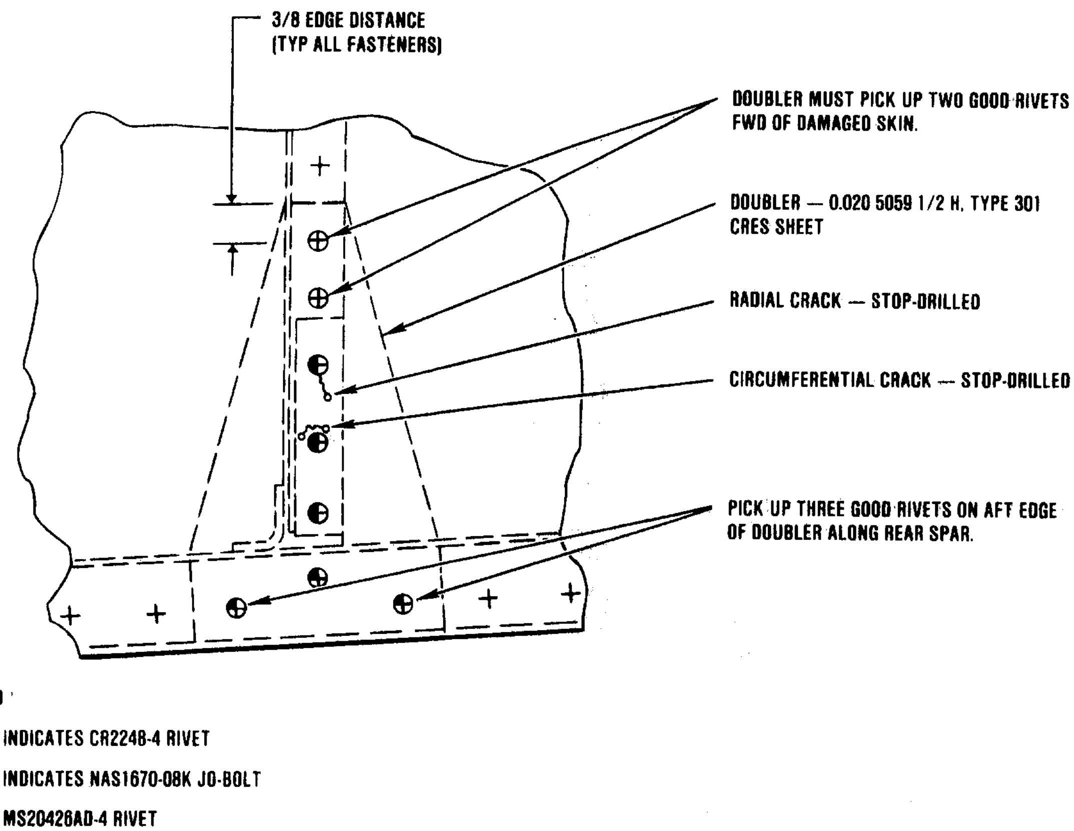
8 Reinstall doubler between damaged skin and rib. Install fasteners as indicated.

NOTES

- RADIAL CRACKS ARE NOT TO EXCEED ONE HALF THE DISTANCE BETWEEN FASTENERS. IF MORE THAN ONE DIMPLE IS RADIALLY CRACKED ON ANY RIB FASTENER ROW, A STANDARD REPAIR FOR CONSTANT—THICKNESS SKINS MUST BE MADE.
- CIRCUMFERENTIAL CRACKS ARE NOT TO EXCEED 3/8 IN. IN LENGTH. TWO CIRCUMFERENTIAL CRACKS MAY BE REPAIRED ON EACH RIB.

S370-3-63A

Repairing Cracked Dimples in Horizontal Stabilizer Upper Skin
Figure 203 (Sheet 3 of 4)



REPAIR FOR ONE RADIALLY CRACKED DIMPLE OR TWO CIRCUMFERENTIALLY CRACKED DIMPLES AT HORIZONTAL STABILIZER TRAILING EDGE JO-BOLT FASTENERS

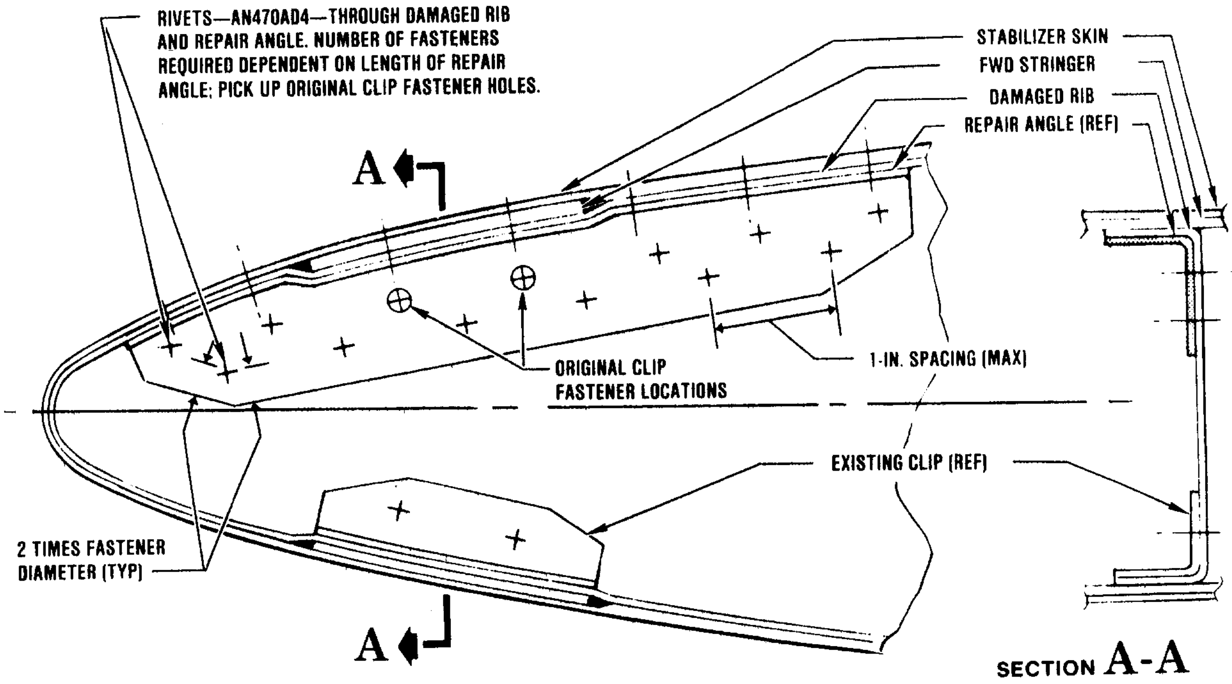
1. Stop-drill cracks with a No. 40 (0.098-in.) drill.
2. Fabricate doubler to approximate size. Doubler must pick up two good existing fasteners of damaged fastener holes and three good existing fasteners on aft edge of doubler along rear spar.
3. Remove all fasteners to be picked up by doubler.
4. Slide doubler in place between damaged skin and rib.
5. Drill through existing fastener locations to locate fastener holes in doubler.
6. Remove doubler and dimple fastener holes in doubler to match existing fastener dimple diameters. Trim to correct size, allowing 3/8-in. edge distance on all fasteners.
7. Prime doubler with epoxy polyamide primer.
8. Reinstall doubler between damaged skin and rib. Install fasteners as indicated.

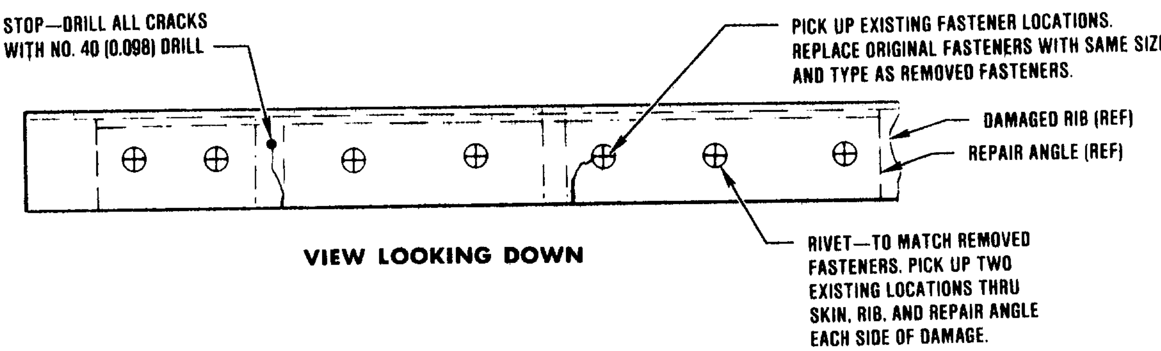
NOTES

- RADIAL CRACKS ARE NOT TO EXCEED ONE HALF THE DISTANCE BETWEEN FASTENERS. IF MORE THAN ONE DIMPLE IS RADIALLY CRACKED ON ANY RIB FASTENER ROW, A STANDARD REPAIR FOR CONSTANT—THICKNESS SKINS MUST BE MADE.
- CIRCUMFERENTIAL CRACKS ARE NOT TO EXCEED 3/8 IN. IN LENGTH. TWO CIRCUMFERENTIAL CRACKS MAY BE REPAIRED ON EACH RIB.

S370-3-64A

**Repairing Cracked Dimples in Horizontal Stabilizer Upper Skin
Figure 203 (Sheet 4 of 4)**





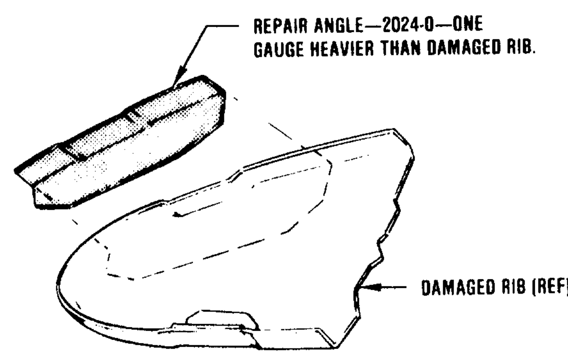
1 Remove existing clip on damaged side of rib.

2 Stop-drill all cracks not extending to rib flange edge.

3 Fabricate repair angle and heat-treat it to the T42 condition after forming.

4 Prime repair angle.

5 Install repair angle as shown.

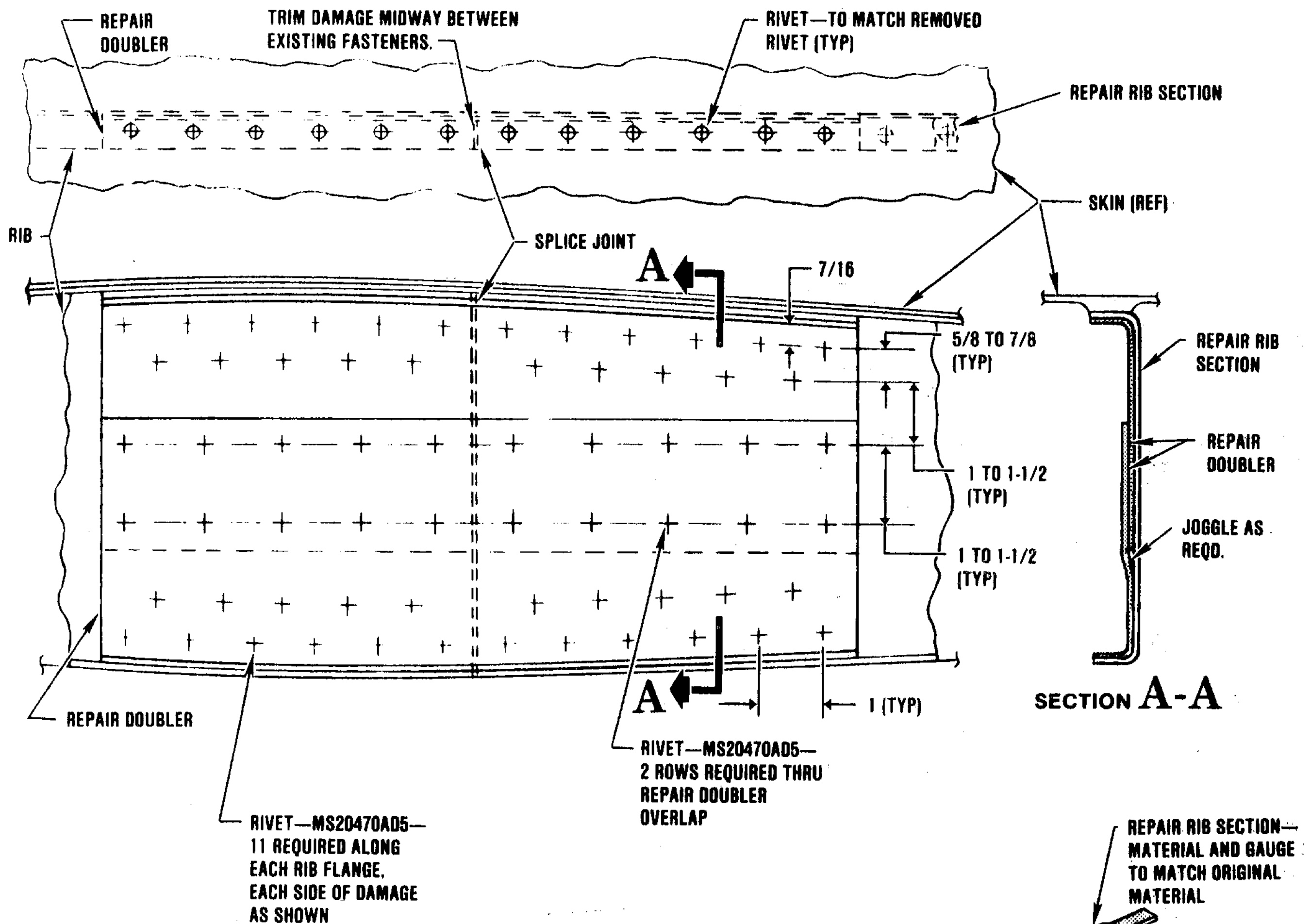


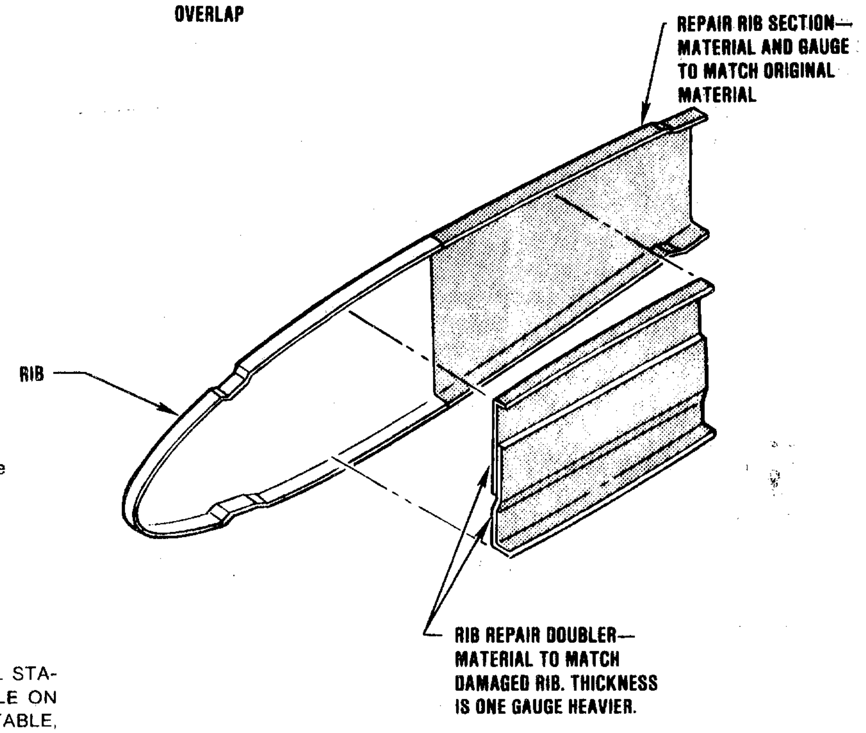
NOTE

REPAIR ANGLE MUST NEST SECURELY IN DAMAGED RIB, TO MAINTAIN PROPER EDGE DISTANCE ON EXISTING FASTENER LOCATIONS.

S265-3-199

Horizontal Stabilizer Rib Repairs — General
Figure 204 (Sheet 1 of 4)





1 Trim off damaged rib end.

2 Fabricate repair parts.

3 Heat-treat parts made from annealed material to the T42 or T6 condition as applicable.

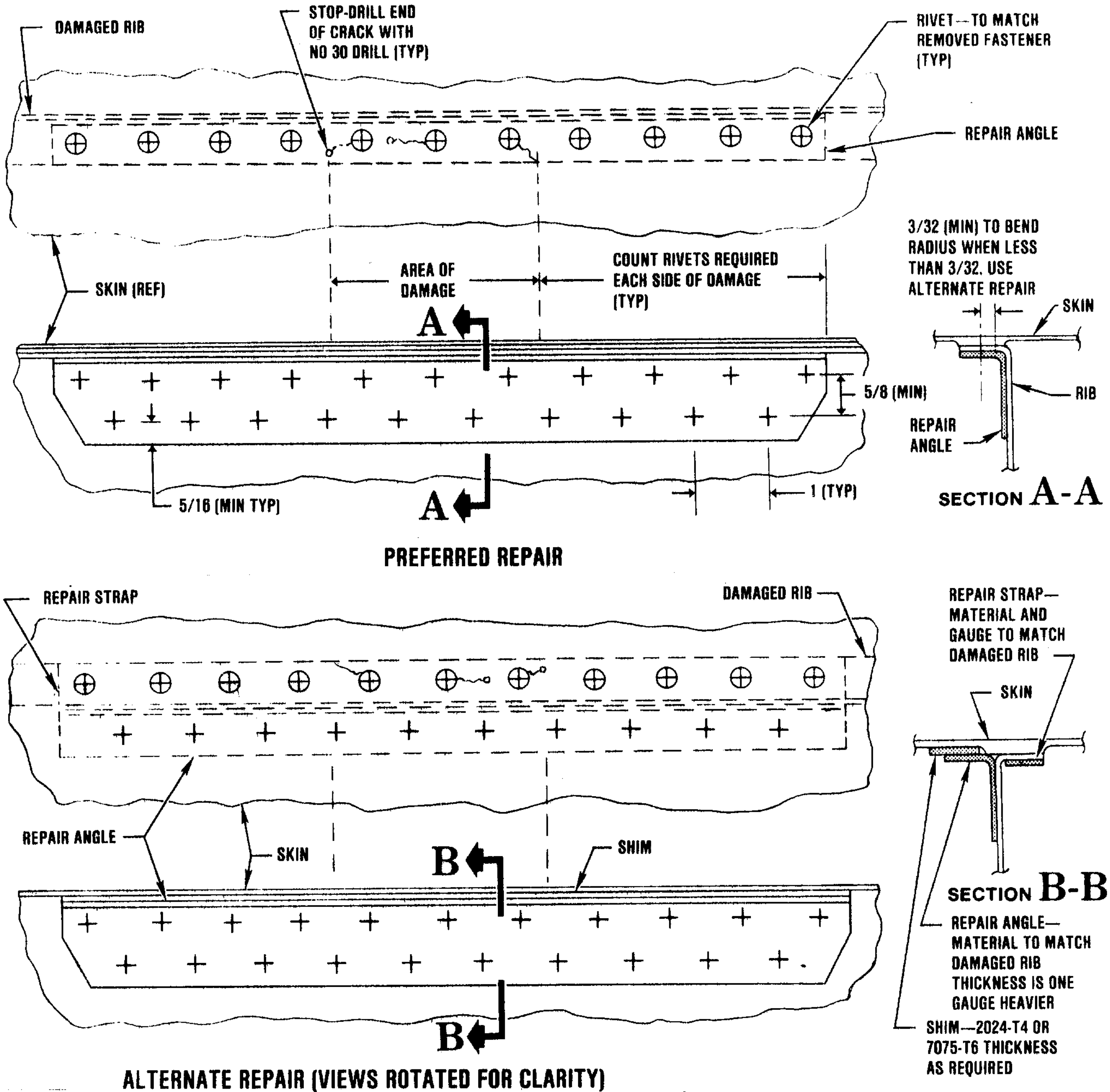
4 Install repair parts.

NOTE

THIS REPAIR IS APPLICABLE TO HORIZONTAL STABILIZER RIBS LISTED IN THE FASTENER TABLE ON SHEET 4. (OTHER DATA IN THE FASTENER TABLE, HOWEVER, DOES NOT APPLY TO THIS SPLICE.)

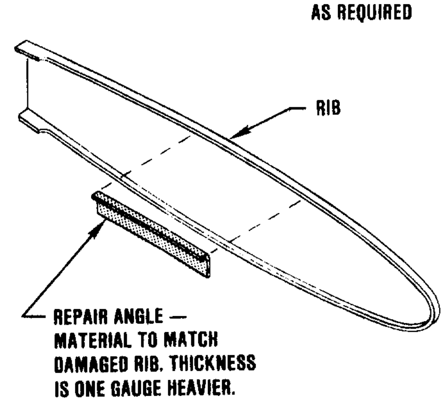
8265-3-200

Horizontal Stabilizer Rib Repairs — General
Figure 204 (Sheet 2 of 4)



1 Stop-drill all cracks which terminate within the part.

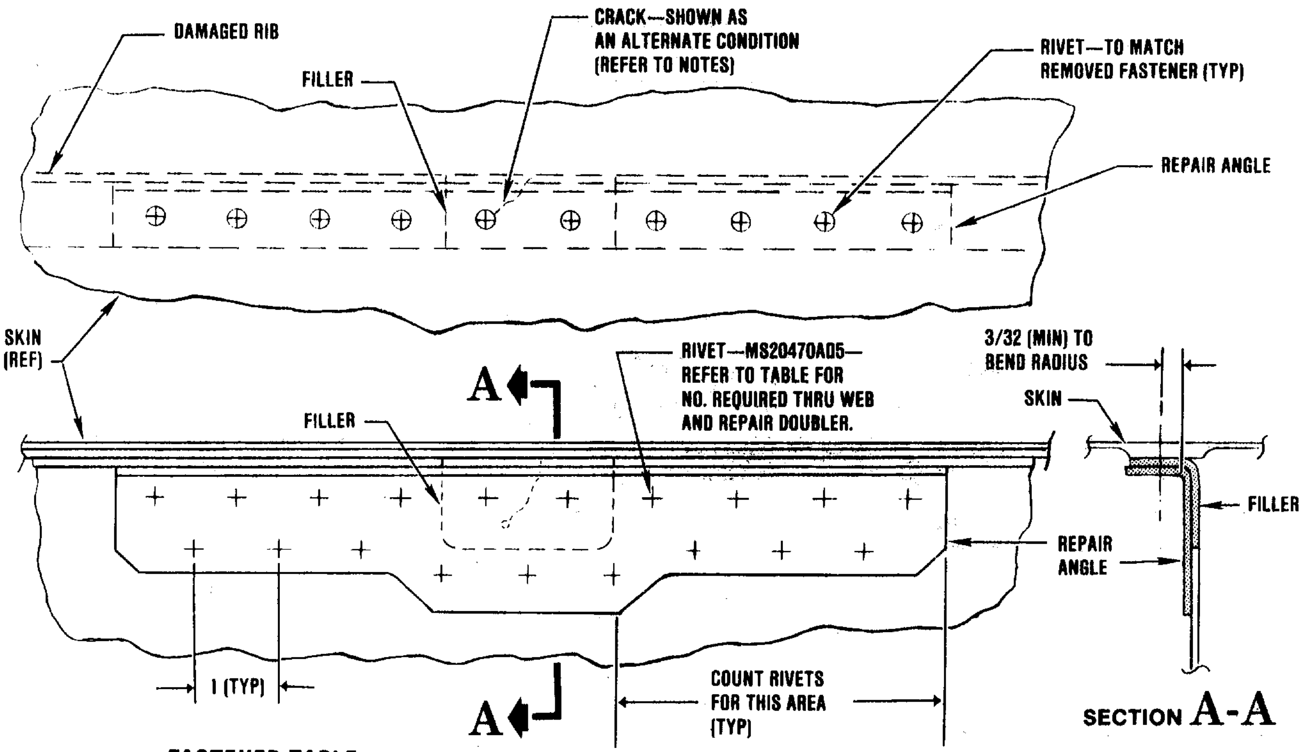
2 Fabricate and install repair parts.



NOTES

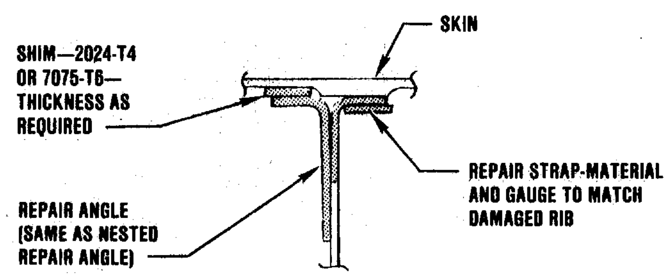
- THIS REPAIR IS APPLICABLE TO HORIZONTAL STABILIZER RIBS LISTED IN THE FASTENER TABLE ON SHEET 4.
- USE NESTED (PREFERRED) REPAIR WHEN SKIN RIVET-TO-RIB-WEB DISTANCE IS ADEQUATE. (SEE SECTION A-A.)
- IF CRACK EXTENDS INTO RIB WEB, SEE SHEET 4 FOR REPAIR.

Horizontal Stabilizer Rib Repairs — General
Figure 204 (Sheet 3 of 4)



FASTENER TABLE

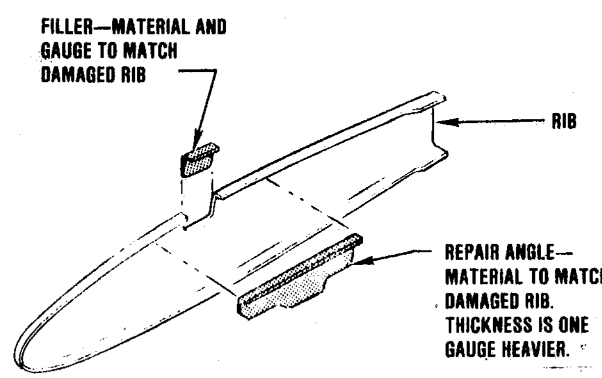
HOR. STAB. RIB STA	NO. OF MS20470AD5 RIVETS REQUIRED EA SIDE OF DAMAGE
18.430	7
29.839	7
36.415	7
42.891	7
48.569	7
56.362	8
63.200	7
70.256	7
77.312	7
89.368	7
91.424	7
98.980	7



ALTERNATE REPAIR (REFER TO NOTES)

1 Trim out damage or stop-drill crack as applicable.

2 Fabricate and install repair parts.

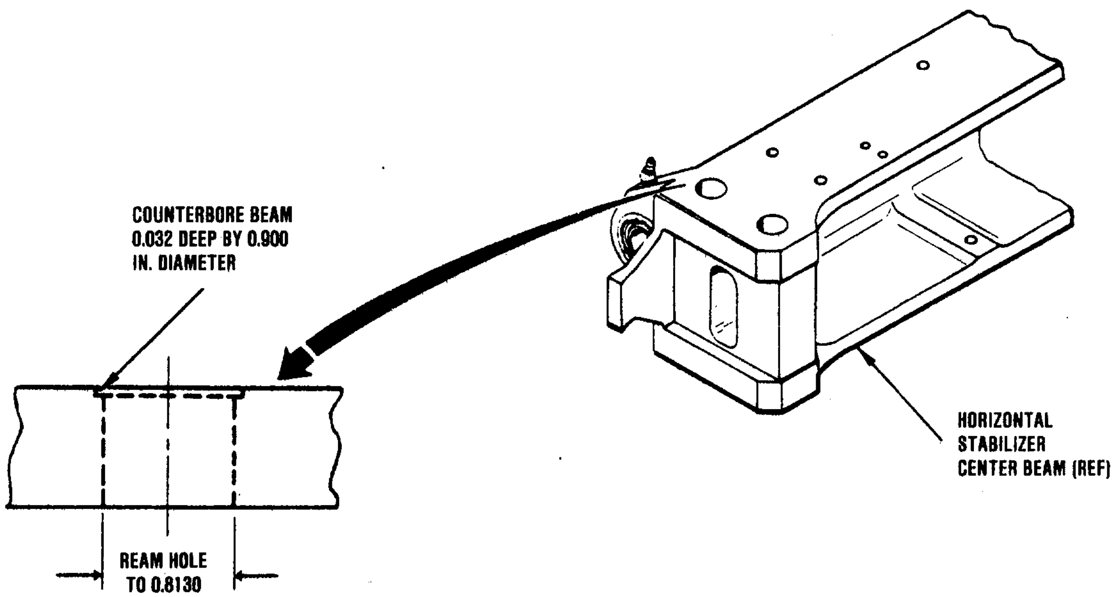


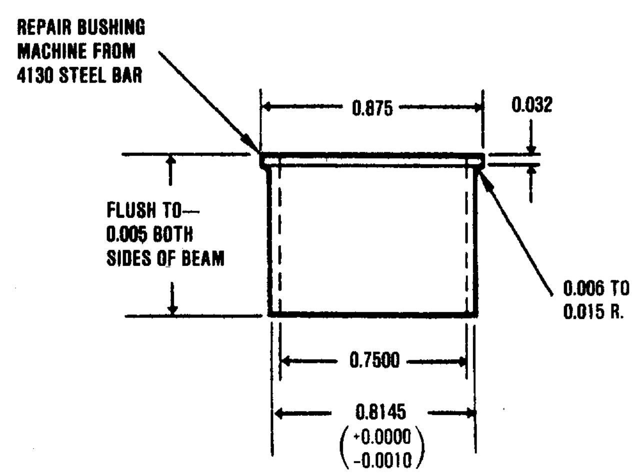
NOTES

- THIS REPAIR IS APPLICABLE TO HORIZONTAL STABILIZER RIB LISTED IN THE FASTENER TABLE.
- USE NESTED (PREFERRED) REPAIR WHEN SKIN RIVET TO-RIB-WEB DISTANCE IS ADEQUATE. (SEE SECTION A-A.)
- WHEN THE RIB DAMAGE IS IN THE NATURE OF A CRACK, THE END OF THE CRACK SHOULD BE STOP-DRILLED AND ALL MATERIAL LEFT IN PLACE. ALL OTHER DETAILS OF THE REPAIR SHOWN REMAIN THE SAME.

8265-3-202

Horizontal Stabilizer Rib Repairs — General
Figure 204 (Sheet 4 of 4)





1 Remove horizontal stabilizer center beam from airplane (Refer to applicable Maintenance Manual).

2 Ream horizontal stabilizer attach holes in beam, then counterbore upper and lower surfaces of beam as shown. Apply chemical film treatment to all bare surfaces of beam.

3 Machine repair bushing to dimensions shown.

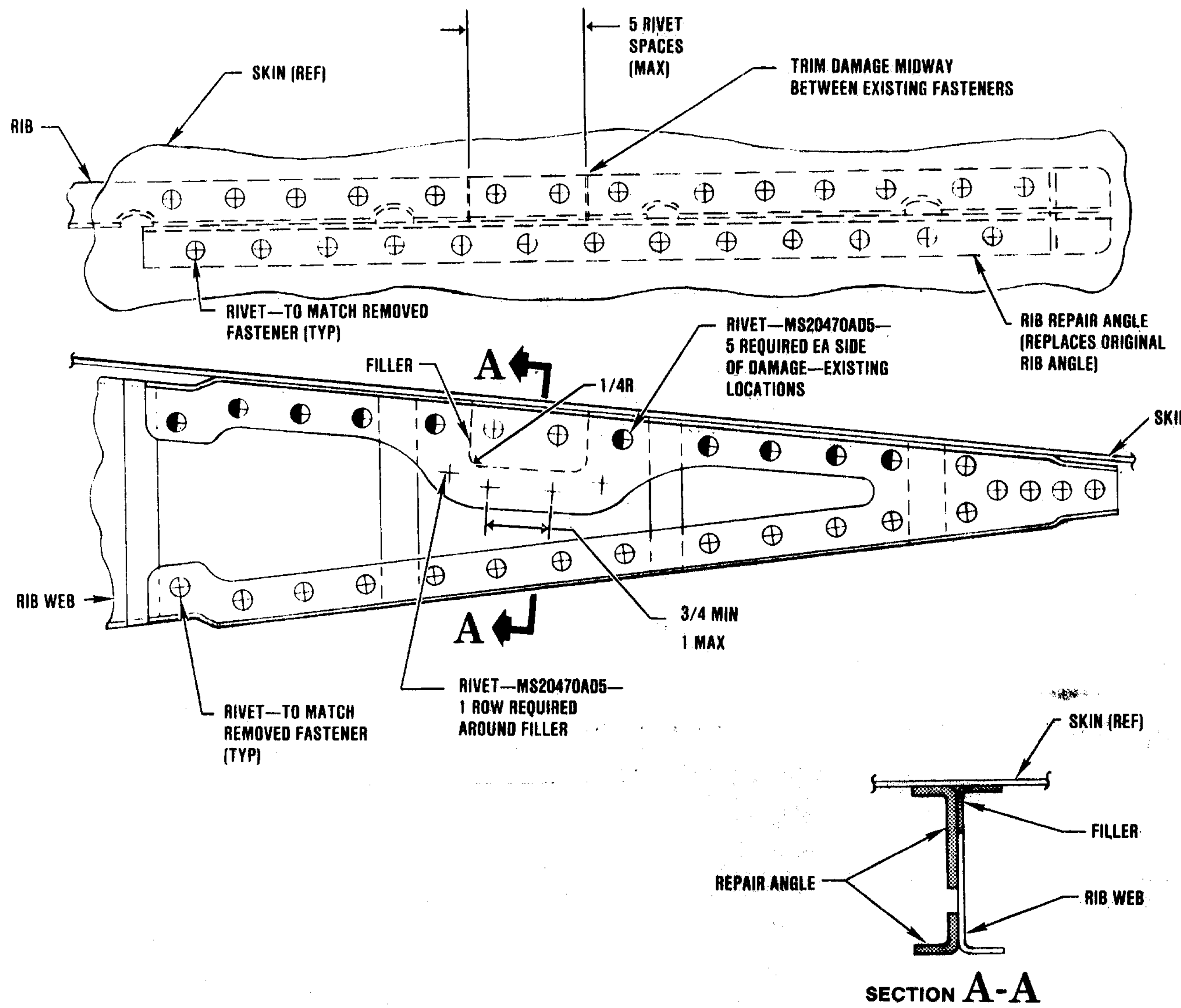
4 Heat treat repair bushing to 125—145 KSI.

5 Cadmium plate repair bushing.

6 Coat bushing with zinc chromate primer and press into place while primer is still wet.

S265-3-351

Horizontal Stabilizer Center Beam — Bushing Repair
Figure 205



1 Remove original rib angle.

2 Trim out damage.

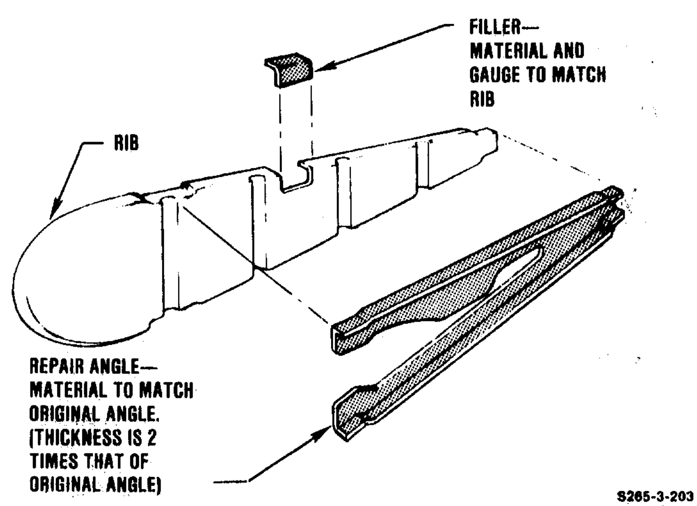
3 Fabricate repair parts. Make repair from annealed material and heat-treat to the applicable "T" condition after forming.

4 Prime repair parts.

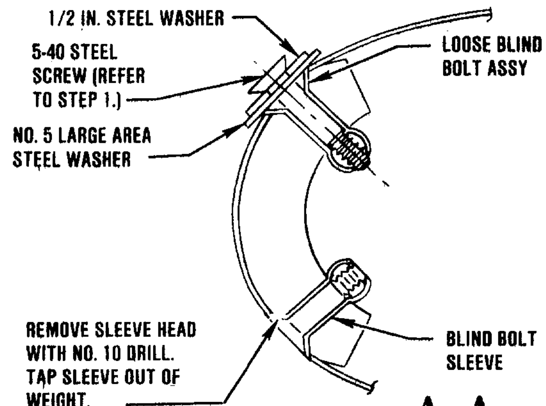
5 Install repair parts.

NOTE

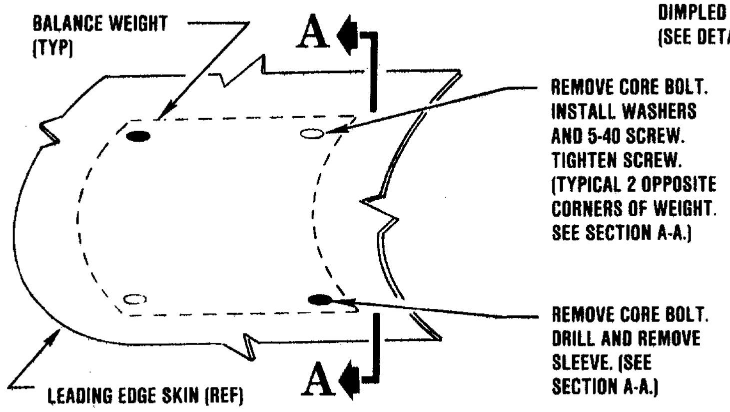
THIS REPAIR IS APPLICABLE TO ALL AIR-LOAD RIBS EXCEPT THE FIRST TWO INBD RIBS AND THE TIP RIB (ELEVATOR STATIONS 13.547, 18.250, AND 105.711). WHEN RIB ANGLE IS DAMAGED, REPLACE ANGLE.



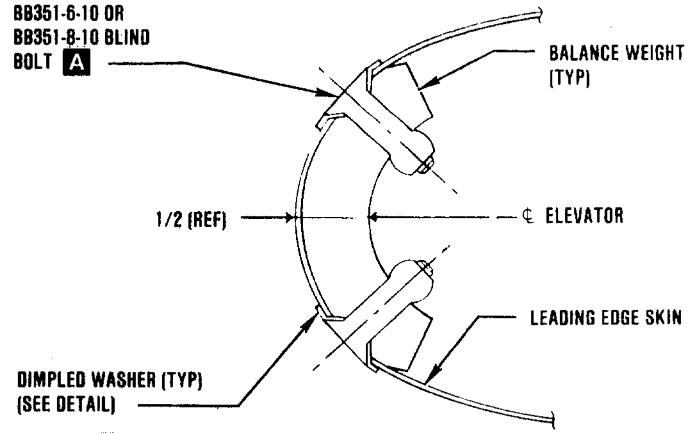
Elevator Air Load Rib Repairs
Figure 206



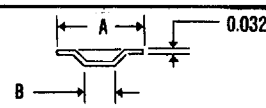
SECTION A-A



BLIND BOLT REMOVAL

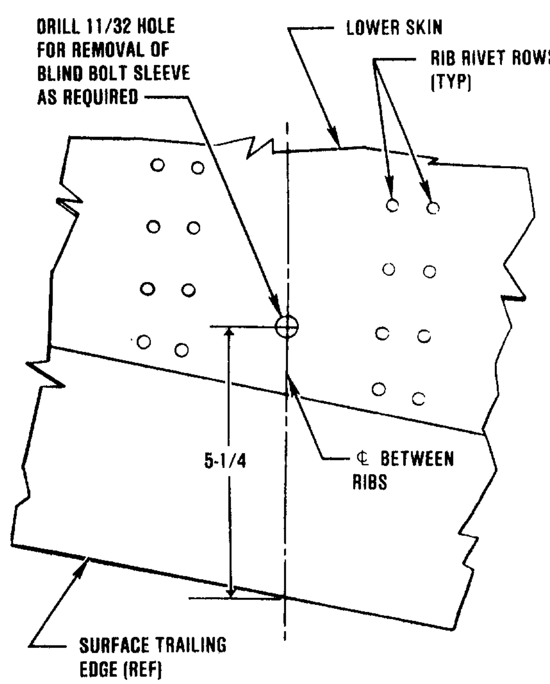


BLIND BOLT INSTALLATION



SLEEVE DIA	A	B—DRILL SIZE
3/16	5/8	9
1/4	11/16	F
MATERIAL—301 1/2 H CRES 1030, 1035, OR 4130 STEEL. HEAT-TREAT CARBON AND ALLOY STEELS TO 125,000 TO 140,000 PSI. CADMIUM PLATE CARBON AND ALLOY STEELS.		

COUNTERSUNK WASHER DATA



1 Remove core bolt from two blind bolts as shown. Install washers and 5-40 screws as shown, and draw weight firmly against skin.

2 Drill off sleeve head and tap sleeve out of weight.

3 Countersink skin and weight to receive countersunk washers. Use BB351-6-10 blind bolt if skin cleans up to fit 3/16 in. countersunk washer. Use BB351-8-10 blind bolt and 1/4 countersunk washer if condition of skin hole requires. (F-200-10 and F-260-10 Jo-bolts **A** may be substituted for BB351-6-10 and BB351-8-10 bolts, respectively, if necessary.)

4 Install fasteners and countersunk washers in prepared holes.

5 Remove temporary 5-40 screws and washers from remaining blind bolt sleeves. Repeat steps 2 through 4.

6 Drill one 11/32 in. hole in each rib bay affected for removal of tapped-out sleeve end. Drill hole in lower skin. (See sketch.)

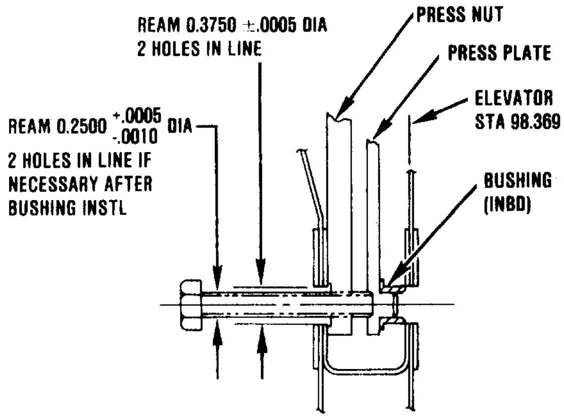
NOTES

- THIS ILLUSTRATION PROVIDES INSTRUCTIONS FOR REMOVAL AND REPLACEMENT OF FASTENERS IN ELEVATOR BALANCE WEIGHTS.
- CONTOUR WASHER EDGES TO MATCH LE CONTOUR BEFORE HEAT-TREATING.

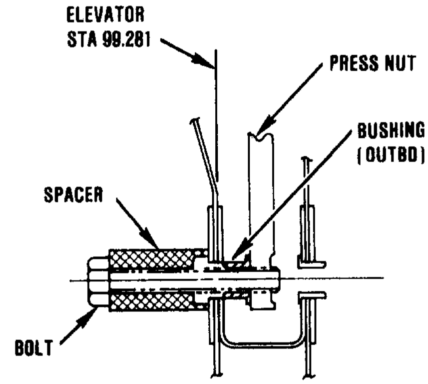
A REFER TO SOURCE KEY 020 AND 021 IN 51-30-20.

S265-3-204

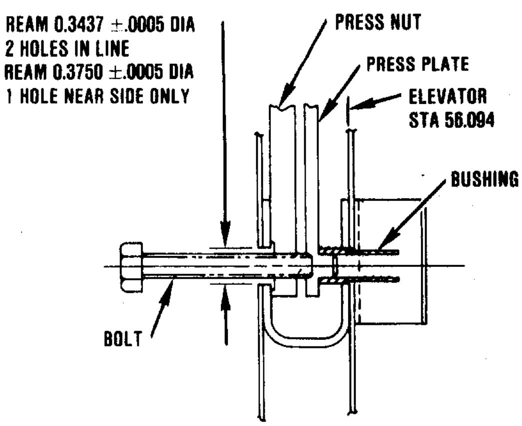
Replacing Fasteners in Loose Elevator Balance Weights
Figure 207



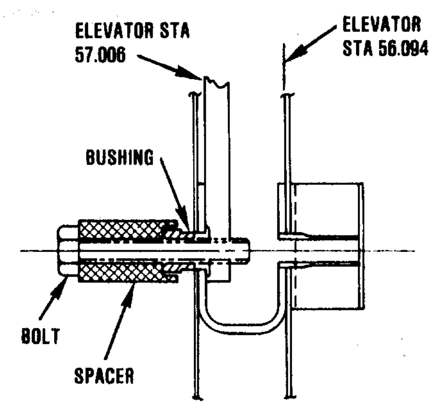
INSTALLING INBD BUSHING
IN ELEVATOR OUTBD HINGE



INSTALLING OUTBD BUSHING
IN ELEVATOR OUTBD HINGE



INSTALLING INBD BUSHING IN
ELEVATOR INTERMEDIATE HINGE



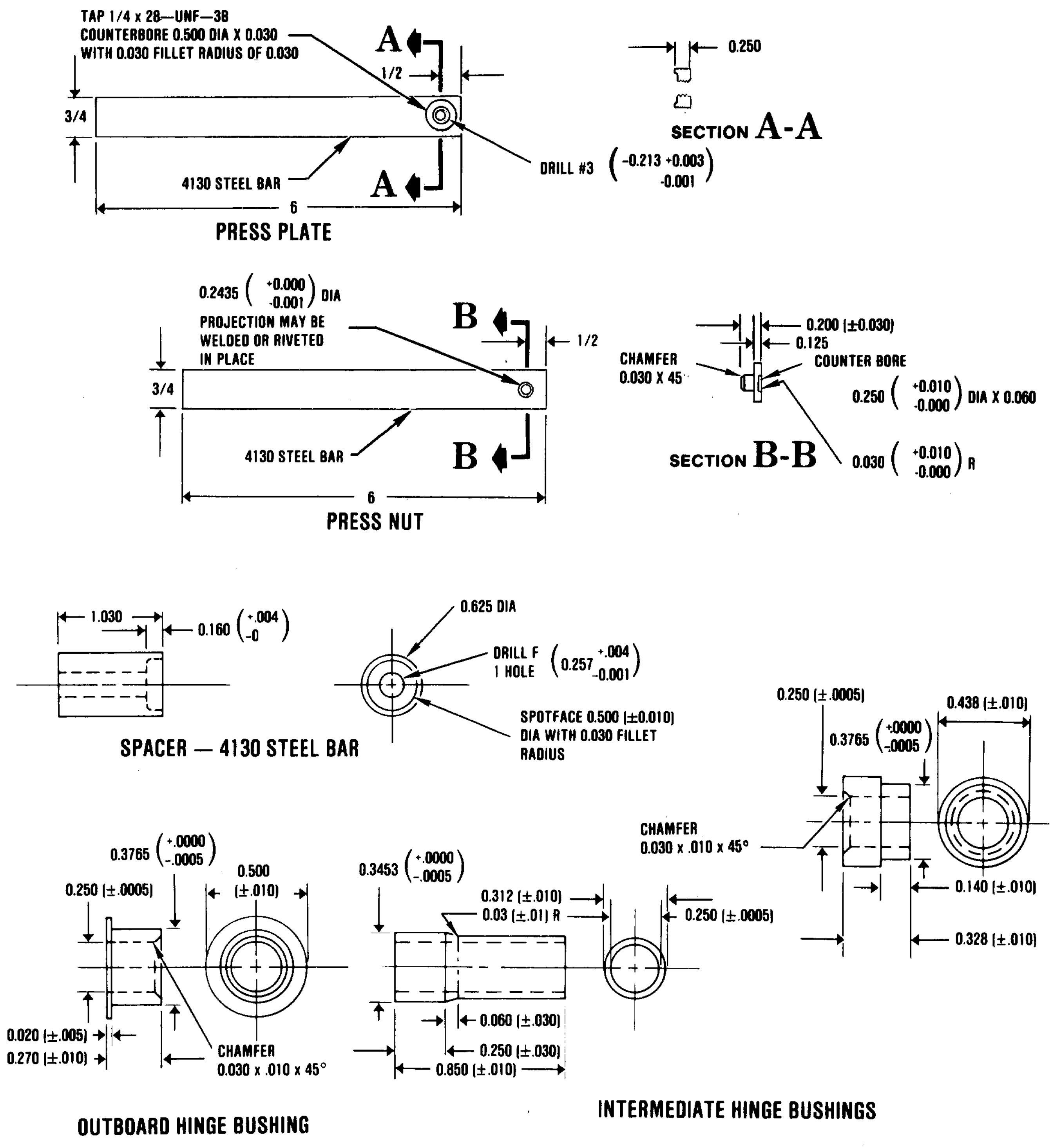
INSTALLING OUTBD BUSHING IN
ELEVATOR INTERMEDIATE HINGE

NOTE

SEE SHEET 2 FOR DETAILS OF BUSHINGS AND BUSHING INSTALLATION TOOLS.

S370-3-80

Elevator, Intermediate and Outboard Hinges, Bushing Repair
Figure 208 (Sheet 1 of 2)

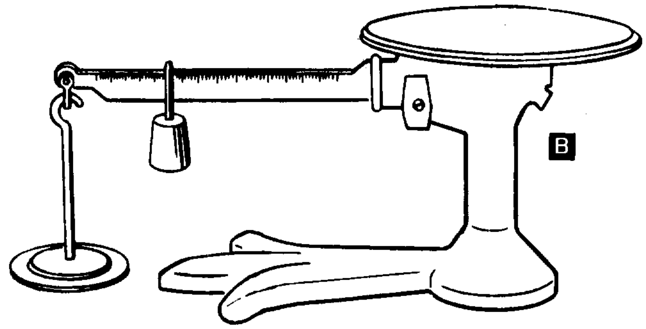


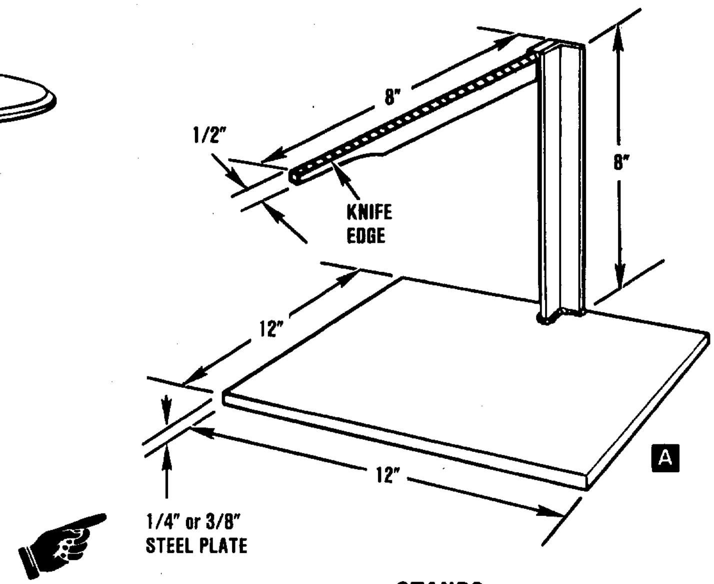
NOTES

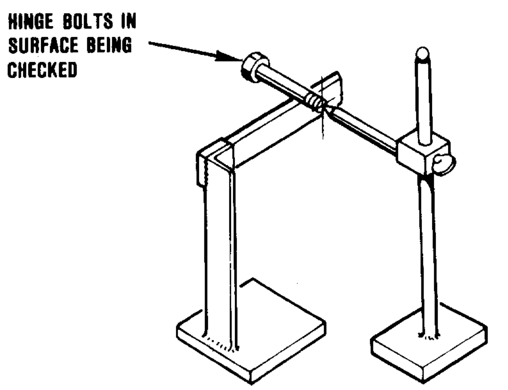
- BUSHING MATERIAL IS 4130 STEEL.
- DIMENSIONS ARE BEFORE PLATING.
- HEAT—TREAT BUSHINGS TO 125 — 140 KSI.
- CADMIUM PLATE ALL SURFACES EXCEPT I.D.

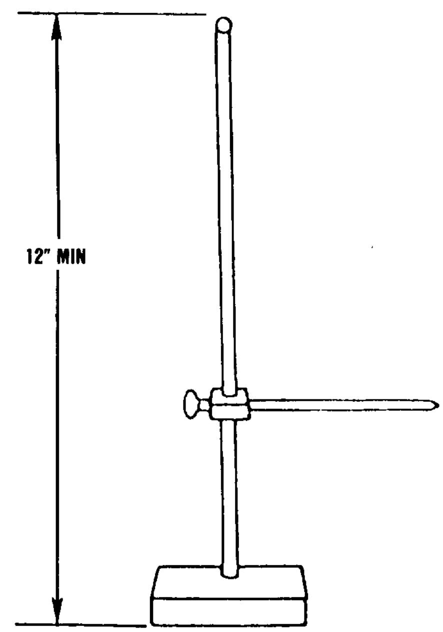
S370-3-81A

Elevator, Intermediate and Outboard Hinges, Bushing Repair
Figure 208 (Sheet 2 of 2)









NOTES

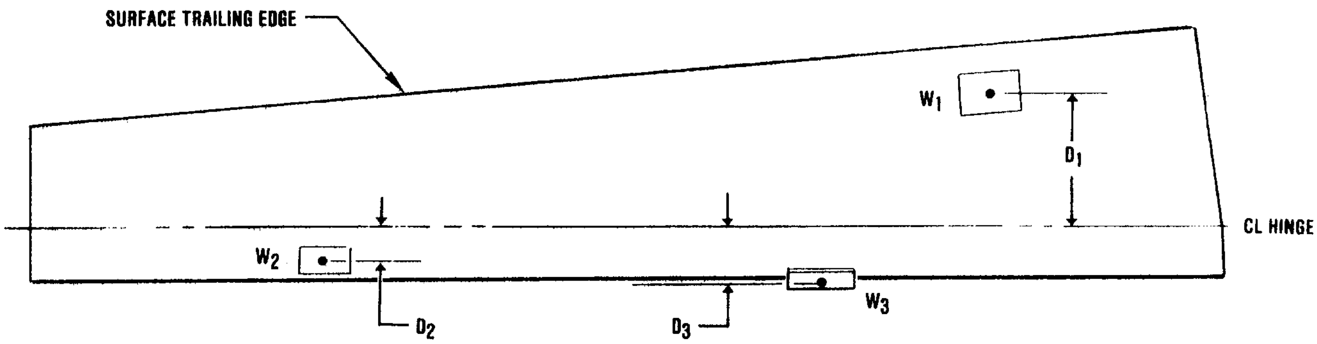
- *In addition to the tools shown, the following will also be required:*

  Adhesive Tape
  Chalk Line
  Carpenters Square
  Plastic medicine bottle to hold test weights (Lead Shot)

A *Stands — two ea. may be local mfg from 1/4" steel plate and 1/4" X 1 1/4" X 1 1/4" steel angle welded together.*

B *Scale should have 10 lb capacity (min) and be graduated in 1/100 lb (graduation in 1/2 oz. is max).*

Figure 209 — Static Balance Checking Equipment



W_1—NET WEIGHT OF REPAIR AFT OF HINGE LINE. (NET WEIGHT OF REPAIR IS THE TOTAL WEIGHT OF REPAIR MINUS WEIGHT OF ANY REMOVED MATERIAL.)

W_2—NET WEIGHT OF REPAIR FWD OF HINGE LINE.

W_3—WEIGHT OF REPAIR BALANCE WEIGHT.

D_1—DISTANCE FROM CG OF W_1 TO CL OF HINGE.

D_2—DISTANCE FROM CG OF W_2 TO CL OF HINGE.

D_3—DISTANCE FROM CG OF W_3 TO CL OF HINGE.

CALCULATING REBALANCE WEIGHT REQUIREMENTS

The moment (inch-pound effect) of a repair is found by multiplying the weight of the repair by the moment arm (distance from CG of repair to the hinge centerline). The weight of the rebalance weight required to counterbalance the repair is found by dividing the inch-pound effect of the repair by the distance from the CG of the rebalance weight to the hinge centerline.

Considering repair W_1 only in the sketch, the formula is $\frac{W_1 \times D_1}{D_3} = W_3$.

EXAMPLE
(assigning possible numerical values)

$W_1 = 0.5$ lb

$D_1 = 10.5$ in.

$D_3 = 4.75$ in.

SOLUTION

$$W_3 = \frac{\overset{(W_1)\,(D_1)}{0.5 \times 10.5}}{\underset{(D_3)}{4.75}} = \frac{5.25}{4.75} = 1.1 \text{ lb}$$

If a leading edge repair, represented by W_2 in the sketch, is installed simultaneously with the repair represented by W_1, the counterbalancing effect of W_2 is subtracted from the inch-pound effect of W_1 before solving for the rebalance weight (W_3). Using the values given in the first example and assigning W =0.4 lb and D =2.5 in., the solution is:

$$W_3 = \frac{\overset{(W_1)\,(D_1)}{(0.5 \times 10.5)} - \overset{(W_2)\,(D_2)}{(0.4 \times 2.5)}}{\underset{(D_3)}{4.75}} = \frac{4.25}{4.75} = 0.89 \text{ lb}$$

NOTE

CALCULATION MAY BE MADE USING 0.284 POUND PER CUBIC IN. FOR STEEL ALLOYS AND 0.1 POUND PER CUBIC IN. FOR ALUMINUM ALLOYS.

ALLOWABLE MOMENT OF INERTIA INCREASE

The allowable moment of inertia increase (expressed in lb in.^{2}) determines the permissible extent of repairs in relation to the total weight that must be added (repair plus rebalance weight).

The moment of inertia increase is the sum of the increases from each added weight.

Referring to the sketch, the formula would be:

$$\text{Moment of inertia increase} = (W_1 \times D_1^2) + (W_2 \times D_2^2) + (W_3 \times D_3^2)$$

Using the values assigned in calculating rebalance weight requirements:

$$\text{Moment of inertia increase} = (0.5 \times 10.5^2) + (0.4 \times 2.5^2) + (0.89 \times 4.75^2)$$

$$= 55.13 + 2.5 + 20.1$$

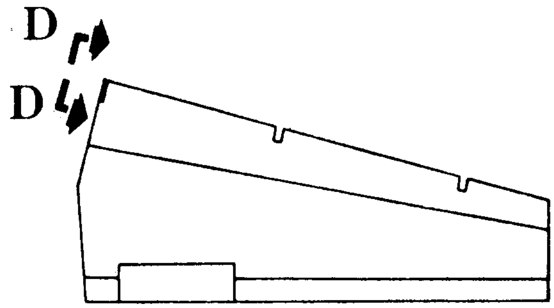
$$= 77.73 \text{ lb in.}^2$$

MOMENT OF INERTIA INCREASE LIMITS

See "Adding Rebalance Weights" illustrations in this section.

S265-3-189

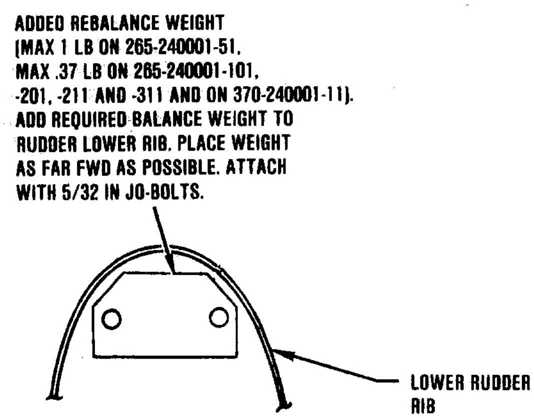
Static Rebalance Calculations
Figure 210



RUDDER

NOTES

- ADDITIONAL REBALANCE WEIGHT MAY BE ADDED THROUGH THE TRIM ACTUATOR ACCESS DOOR.
- MAXIMUM MOMENT OF INERTIA INCREASE IS 171 LBS. IN.^{2} ON 265-240001-51
- MAXIMUM MOMENT OF INERTIA INCREASE IS 86 LBS. IN.^{2} ON 265-240001-101, -201, -211, AND -301 AND ON 370-240001-11.



SECTION D-D

REBALANCING DATA FOR MODEL NA 265-40, S/N 282-1 THRU -53, AND AIRPLANES NOT CHANGED BY S/L 66-10.

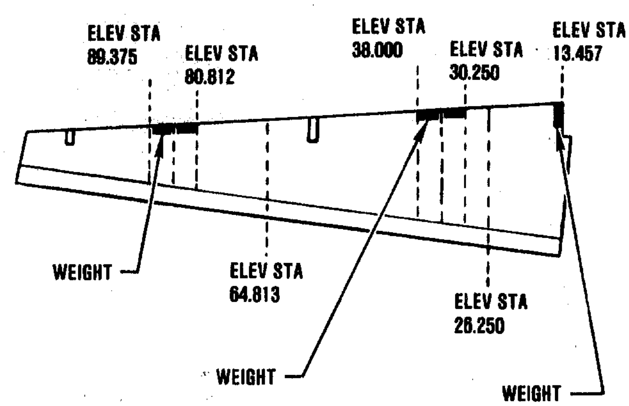
NOTES

- FOR REPAIR INBD OF ELEVATOR STATION 26.250, ADD WEIGHT TO INBD RIB (ELEVATOR STATION 13.457). IF MORE WEIGHT IS NEEDED, ADD IT BETWEEN ELEVATOR STATIONS 30.250 AND 38.000.
- FOR REPAIR BETWEEN ELEVATOR STATIONS 26.250 AND 64.813, ADD WEIGHT BETWEEN ELEVATOR STATIONS 30.250 AND 38.000.
- FOR REPAIR OUTBD OF ELEVATOR STATION 64.813, ADD WEIGHT BETWEEN ELEVATOR STATIONS 80.812 AND 89.375. IF MORE WEIGHT IS NEEDED, ADD IT BETWEEN STATIONS 30.250 AND 38.000. THE WEIGHT ADDED BETWEEN THESE STATIONS MUST NOT EXCEED TWO THIRDS OF THAT REQUIRED TO BALANCE THE ALLOWABLE INERTIA INCREASE.
- MAXIMUM MOMENT OF INTERTIA INCREASE IS 78 LB IN.^{2}

REBALANCING DATA FOR MODEL NA 265-40, S/N 282-1 THRU -53, CHANGED BY S/L 66-10, MODEL NA 265-40, S/N 282-54 AND LATER, AND MODEL NA 265-60, -70, AND -80.

NOTES

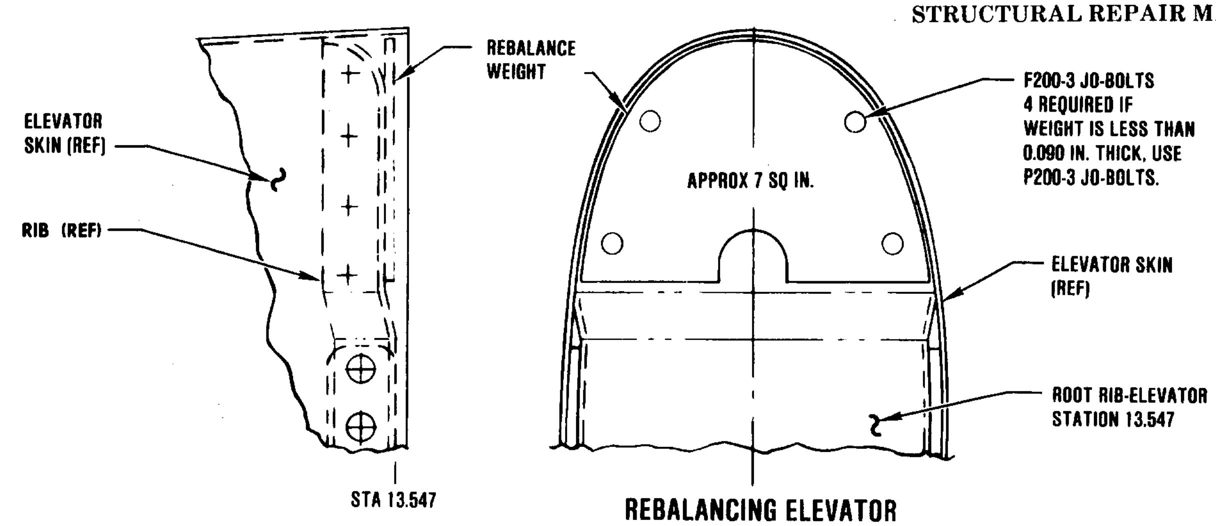
- ON THE ABOVE NOTED AIRPLANES THE ONLY AREA WHERE BALANCE WEIGHTS MAY BE ADDED IS AT ELEVATOR STATION 13.457.
- MAXIMUM MOMENT OF INERTIA INCREASE IS 56 LB. IN.^{2}



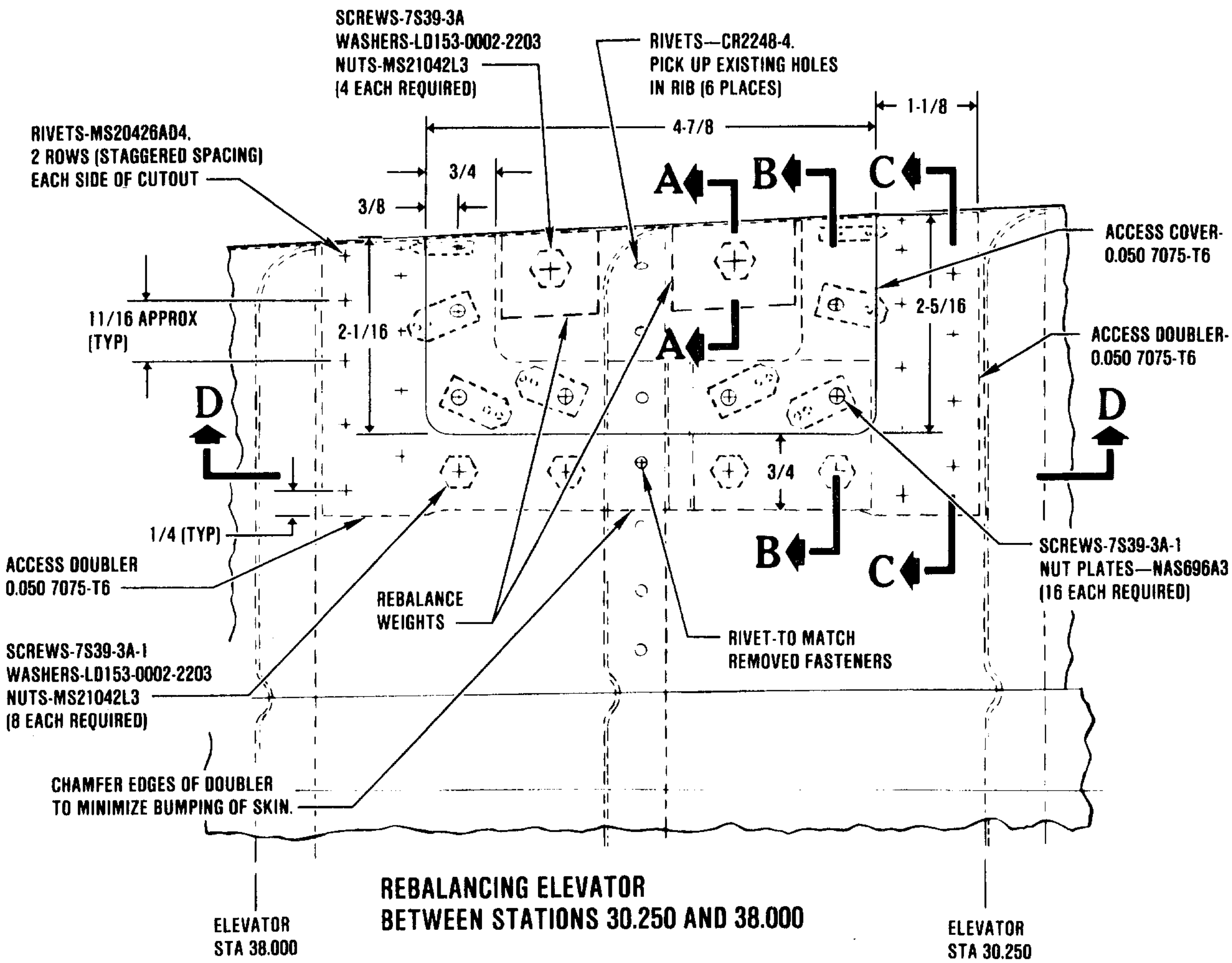
ELEVATOR

8265-3-190B

Adding Rebalance Weights
Figure 211 (Sheet 1 of 5)



REBALANCING ELEVATOR AT STATION 13.457



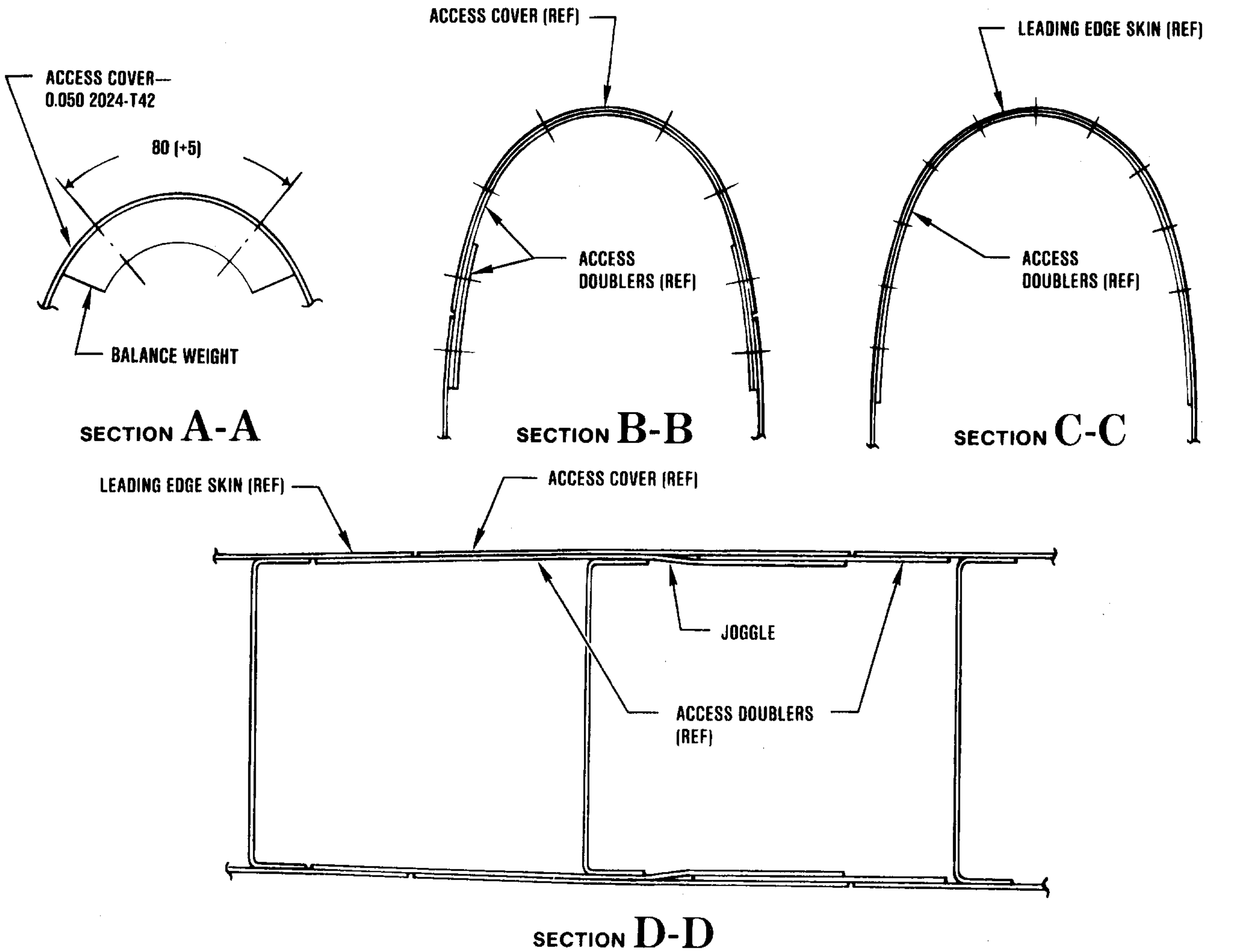
REBALANCING ELEVATOR BETWEEN STATIONS 30.250 AND 38.000

NOTES

- DETAILS FOR FABRICATING WEIGHTS ARE ON SHEET 5.
- SECTIONS AND PROCEDURES FOR INSTALLING WEIGHTS BETWEEN STATIONS 30.250 AND 38.000 ARE ON SHEET 3.

S265-3-191A

Adding Rebalance Weights
Figure 211 (Sheet 2 of 5)



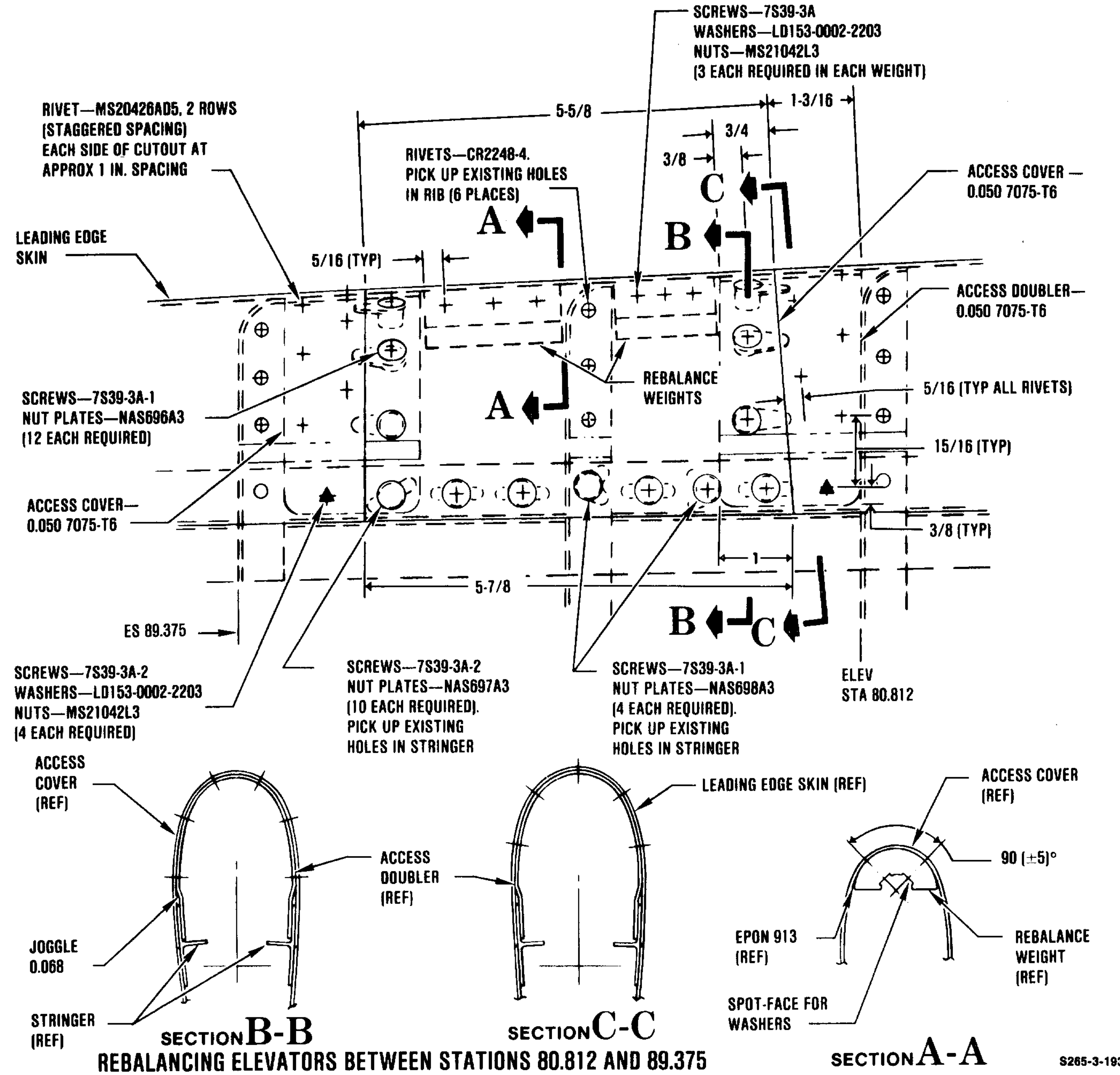
RE-BALANCING ELEVATOR BETWEEN STA 30.250 AND 38.00

1. Trim section out of leading edge skin as shown.
2. Form access doublers to fit. Joggle and chamfer doublers as shown.
3. Form access cover.
4. Prime access doublers.
5. Temporarily install access doublers.
6. Locate access cover on doublers, and drill for nut plates. Remove access cover.
7. Remove access doublers, install nut plates on doublers and install doublers in leading edge as shown.
8. Temporarily attach rebalance weights to access cover and temporarily install access cover on leading edge.
9. Check static balance of elevator.
10. Remove access cover, attach weights to cover with EA934NA adhesive (refer to 51-20-20) and screws as shown.
11. Prime access cover and weights.
12. Install access cover on leading edge.

NOTE
Sections shown are taken from sheet 2.

Adding Rebalance Weights
Figure 211 (Sheet 3 of 5)

S265-3-192



REBALANCING ELEVATORS BETWEEN STATIONS 80.812 AND 89.375

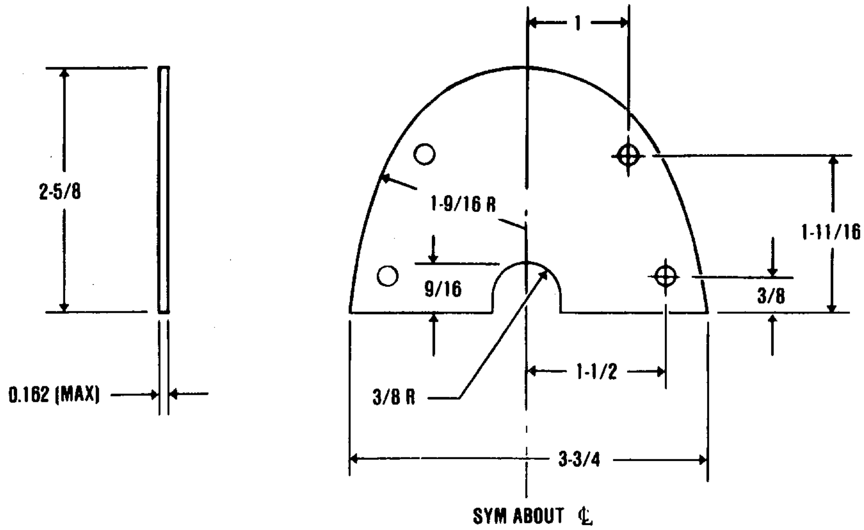
1. Trim section out of leading edge skin as shown.
2. Fabricate and prime access doublers and access cover.
3. Temporarily install access doublers.
4. Locate access cover on doublers, and drill for fasteners. Remove cover.
5. Remove access doublers, install nut plates on doublers, and install doublers as shown.
6. Attach nut plates to stringers.

NOTE

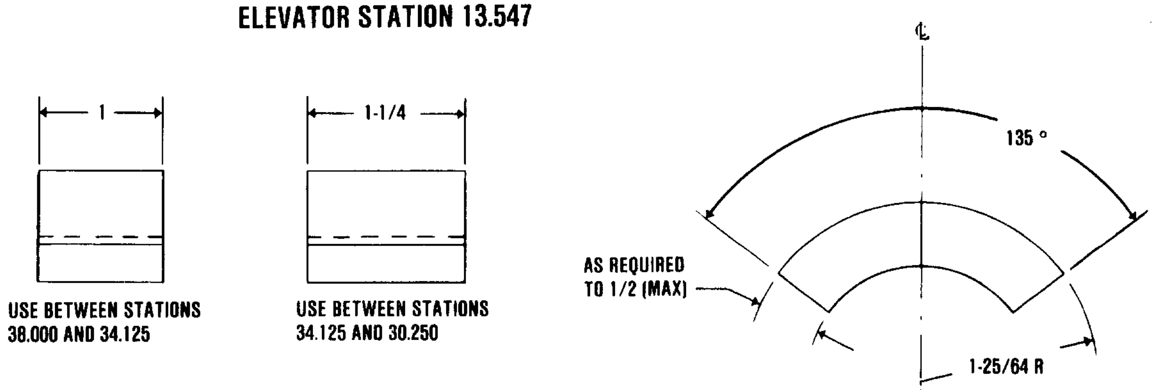
Details for fabricating weights are on sheet 5.

7. Temporarily attach rebalance weights to access cover and temporarily install access cover on leading edge.
8. Check static balance of elevator.
9. Remove access cover, attach weights to cover with EA934NA adhesive (refer to 51-20-20) and screws as shown.
10. Prime cover and weights.
11. Install access cover on leading edge.

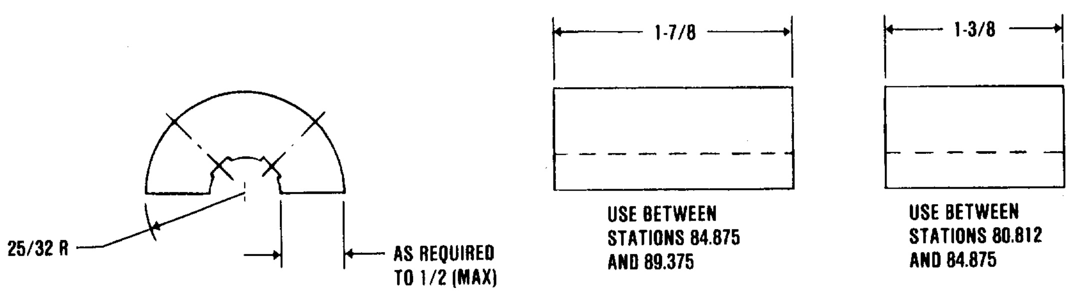
Adding Rebalance Weights
Figure 211 (Sheet 4 of 5)



REBALANCE WEIGHTS —
ELEVATOR STATION 13.547



REBALANCE WEIGHTS—
ELEVATOR STATIONS 30.250
TO 38.000



REBALANCE WEIGHTS —
ELEVATOR STATIONS 80.812 TO 89.375

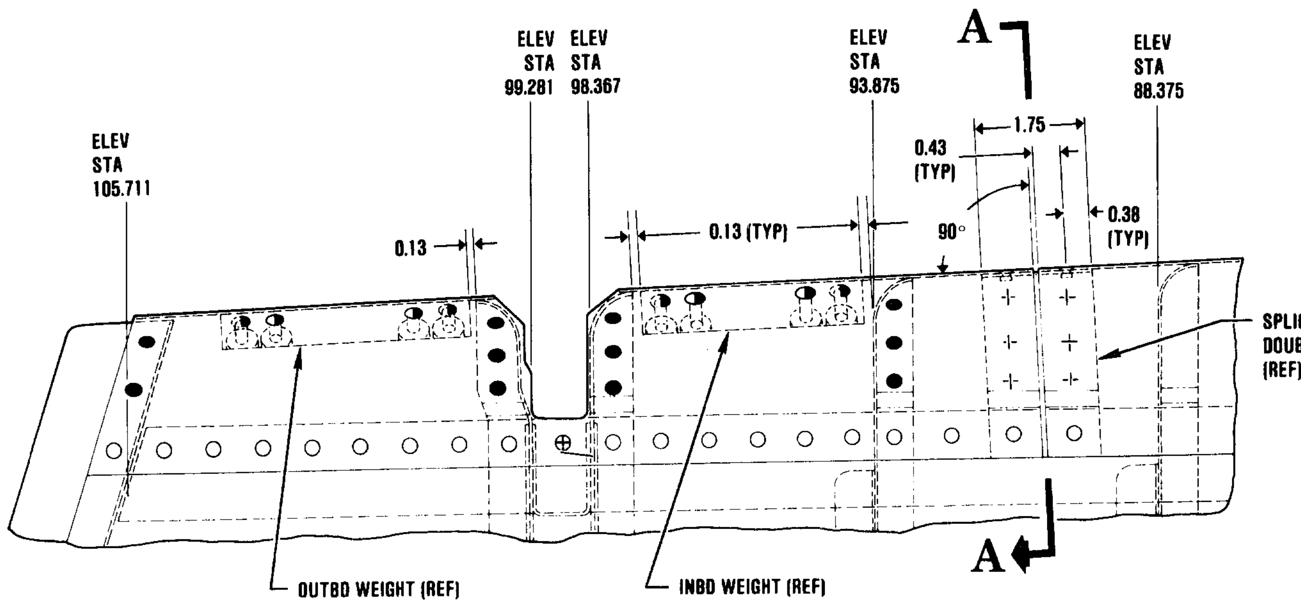
1 Make weights from 1010 steel bar or plate as applicable.

2 Cadmium plate weights after fabrication.

3 Prime weight for station 13.547.

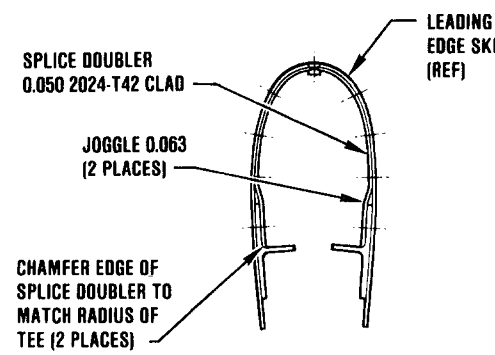
S265-3-194

Adding Balance Weights
Figure 211 (Sheet 5 of 5)



FASTENER CODING

- ● EXISTING FASTENER LOCATION REPLACE WITH NAS 1739-84-2
- ○ EXISTING FASTENER LOCATION REPLACE WITH NAS 1739-84-3
- ⊕ EXISTING FASTENER LOCATION REPLACE WITH MS 20428-4
- + ADDED NAS 1738-84-2 RIVET
- ◑ ADDED 7S39-3 SCREWS & MS21042-L3 NUTS



SECTION A-A

1 Cut elevator leading edge skin in center of bay between elevator stations 93.875 and 89.375. Make cut 90° to leading edge so that cut is midway between fasteners.

2 Drill out all existing fasteners in leading edge skin, outbd of cut.

3 Remove leading edge skin. Smooth edges of skin.

4 Fabricate splice doubler. Pick up existing fasteners.

5 Position splice doubler. Pick up existing fasteners.

6 Remove splice doubler and prime with epoxy polymide primer.

7 Install splice doubler using type and size of fasteners shown.

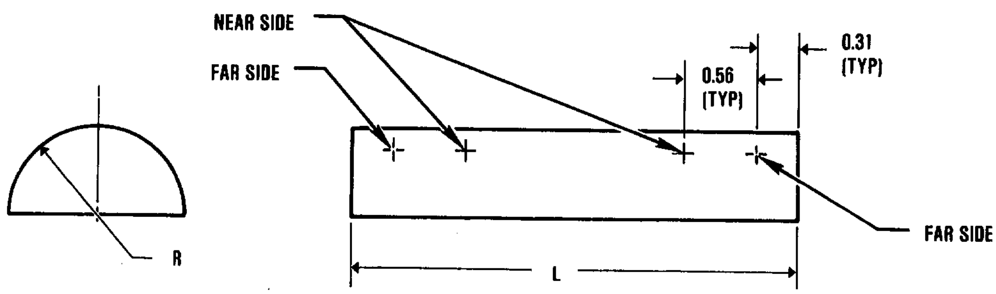
8 Manufacture elevator leading edge inbd and outbd weights.

9 On removed leading edge skin, lay out location of balance weight attachment holes.

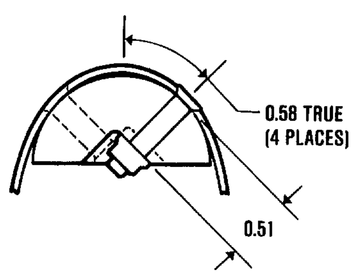
S380-3-4

Adding Balance Weights to Elevators Between Elevator Stations 93.875 and 105.711
Model NA 265-80 only
Figure 212 (Sheet 1 of 2)

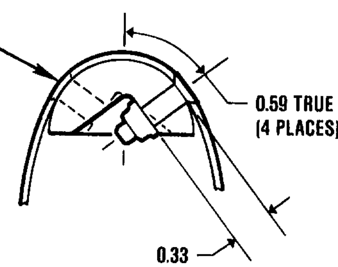
BALANCE WEIGHT DETAILS



	R	L	WEIGHT +0.01 -0.00
INBD WEIGHT	0.638 ±0.005	3.50	0.73
OUTBD WEIGHT	0.562 ±0.005	3.92	0.55



FASTENER LOCATION — INBD WEIGHT



FASTENER LOCATION — OUTBD WEIGHT

10. Using clamps or other methods, secure inbd and outbd balance weights in position on leading edge skin.
11. Pilot drill fastener attachment hole through leading edge skin and balance weights.
12. Drill balance weight fastener holes to full size (No. 10, 0.190/0.94) in 8 places.
13. Remove balance weights from leading edge skin and counterbore balance weights to correct depth.
14. Epoxy polymide prime all surfaces of balance weights, including the counterbores and fastener holes
15. Countersink balance weight fastener holes in leading edge skin so that fasteners are flush in a sparwise direction.
16. Coat faying surfaces of balance weights and leading edge skin with general purpose sealing compound. (PR1431G or equivalent)
17. Install balance weights using size and type fasteners shown.
18. Reinstall removed section of leading edge skin using size and type of fasteners shown.
19. Balance elevator as required.

S380-3-5

Adding Balance Weights to Elevators Between Elevator Stations 93.875 and 105.711 Model NA 265-80 only
Figure 212 (Sheet 2 of 2)

ELEVATOR BALANCE PROCEDURE

NOTE

This balance procedure is for a complete elevator including static wicks and final paint.

1. With the elevator removed from the airplane, prepare it for balancing as follows:
   a. Remove center and outbd floating hinge sections from the elevator.
      1. Remove elevator tip.
      2. Remove outbd hinge pin, remove hinge and reinstall pin.
      3. Remove center hinge pin cover.
      4. Remove center hinge pin, remove hinge and reinstall pin.
      5. Reinstall center hinge cover.
   b. Remove hinge support from elevator torque tube universal link and inbd hinge support.
   c. Install inbd hinge pin or bolt in support and install the hinge support on the root rib of the elevator.
2. Snap a chalk line between the center line of the outbd hinge pin and the center line of the elevator hinge support bearing boss. See Figure 213.
3. Install elevator tip.
4. Using a carpenters square along the hinge center line, mark the spot when 16 inches +1/16 -0 falls in the middle of the trailing edge (forward and aft).
5. Make a copy of the balance weight location marker and center over the 16 inch mark on the trailing edge.
6. Install three static wicks if not installed.

NOTE

Make sure knife edges are sharp and level with no flat spots, as this will affect the balancing.

7. Place balance stands on a level bench and level knife edges.

NOTE

Elevators on the balance stand should always assume a trailing edge up attitude, if not add weight per 55-10-20, Figure 211 or 212.

8. Place elevator on balance stands as shown in Figure 213.
9. Adjust pointer to coincide with center line of hinge bolt or pin.
10. Place pointer at trailing edge of elevator as shown in View AA.
11. Use a plastic medicine bottle (one inch in diameter or less) as a weight container and lead shot or equivalent as weights.

NOTE

This balance procedure is for a complete elevator including static wicks and final paint.

12. Place the weight container on the location marker, and add weight until the elevator trailing edge aligns with the pointer.
13. Weigh the weight container. Every ounce is equivalent to one inch pound. Then compare the inch pounds to Table 1 to find out if your dash number elevator is within limits.
14. If elevator static balance does not fall within limit, add or remove weight per 55-10-20, Figure 211 or 212.

Table 1

ELEVATOR	BALANCE
265-220001-201	1 to 7.5 IN-LB; L.E. Heavy
265-220001-251	1 to 7.5 IN-LB; L.E. Heavy
265-220001-261	1 to 12 IN-LB; L.E. Heavy
265-220001-311	1 to 12 IN-LB; L.E. Heavy
265-220001-321	1 to 12 IN-LB; L.E. Heavy
265-220001-331	5 to 12 IN-LB; L.E. Heavy
265-220001-341	5 to 12 IN-LB; L.E. Heavy
265-220001-342	5 to 12 IN-LB; L.E. Heavy
370-220255-11	1 to 12 IN-LB; L.E. Heavy
370-220255-21	1 to 12 IN-LB; L.E. Heavy
370-220255-31	1 to 12 IN-LB; L.E. Heavy
* Raisbeck Elevators	7.12 to 12 IN-LB; L.E. Heavy

* -60 models per Raisbeck S/B 8.

MAJOR CHANGE

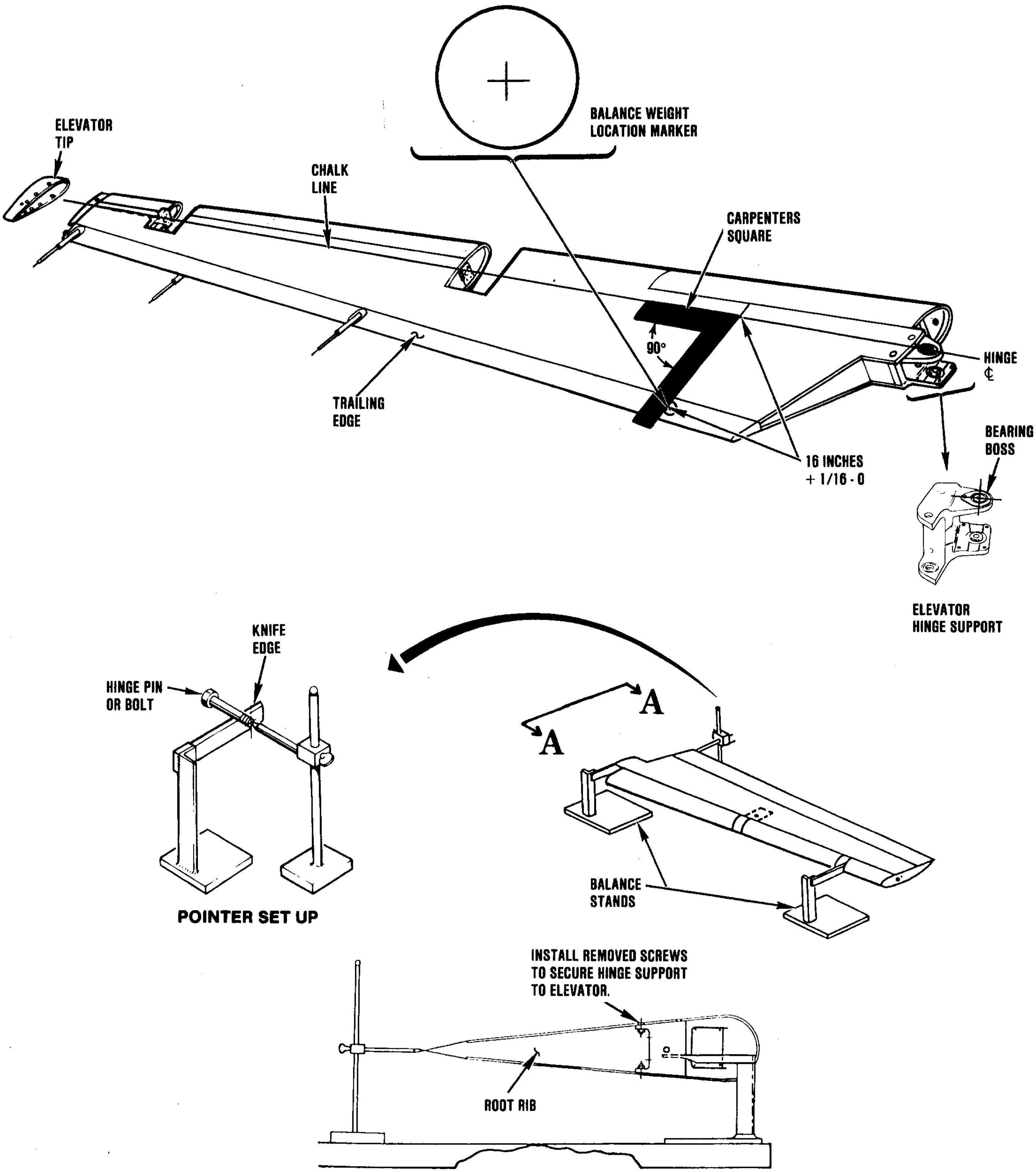


Figure 213 — Checking Elevator Static Balance

VERTICAL STABILIZER

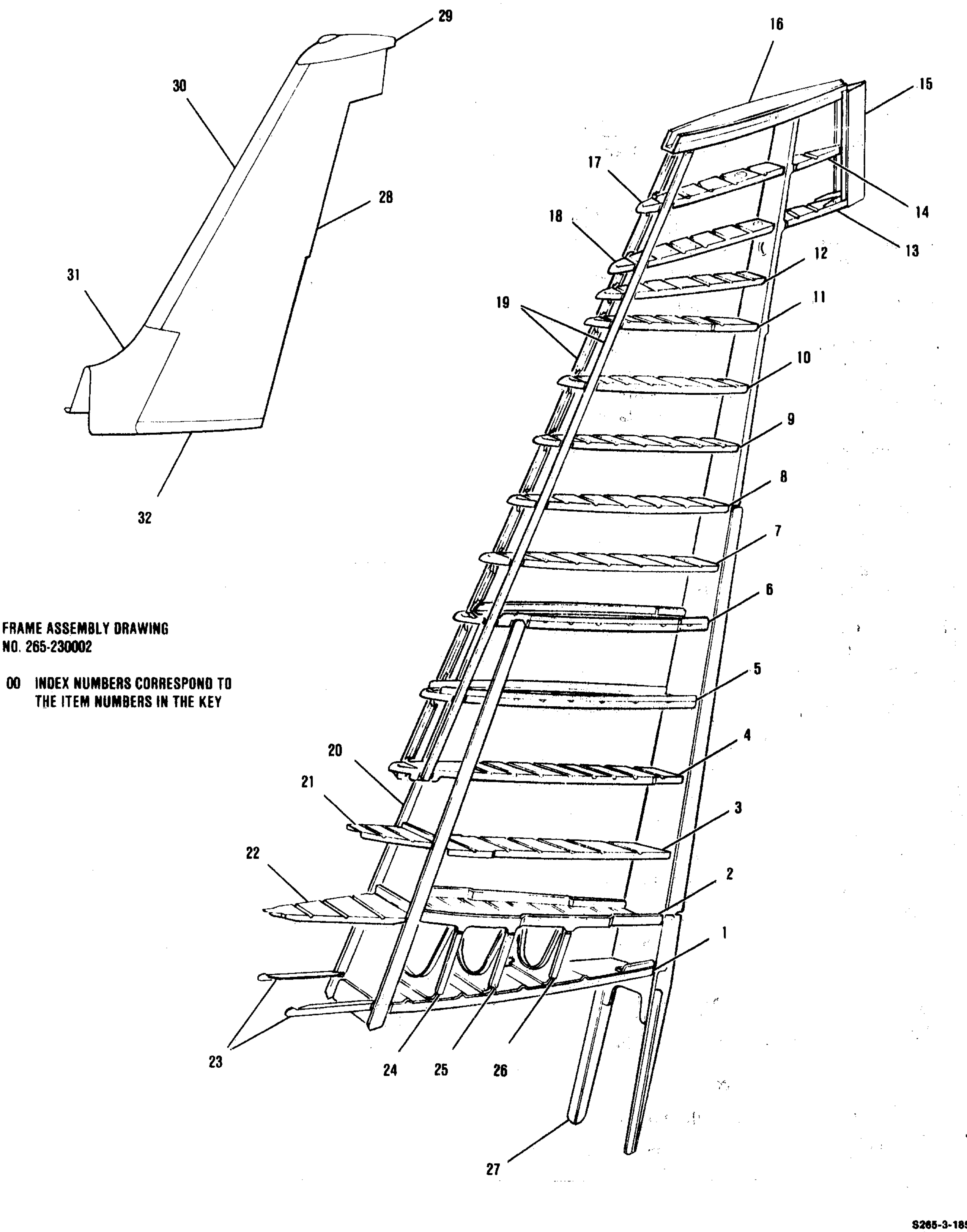
STRUCTURAL IDENTIFICATION

GENERAL

The information in this section applies to the vertical stabilizer. For negligible damage limits, refer to 55-00-10. For repairs, refer to 55-10-20.

VERTICAL STABILIZER REPAIR INDEX

See figure 1 for Model NA 265-40, -60, -60A, -60SC, and -65. See figure 2 for Model NA 265-70, -80, -80A and -80SC.



Vertical Stabilizer Repair Index
Model NA 265-40, -60, -60A, -60SC and -65
Figure 1

STRUCTURAL IDENTIFICATION (Continued)

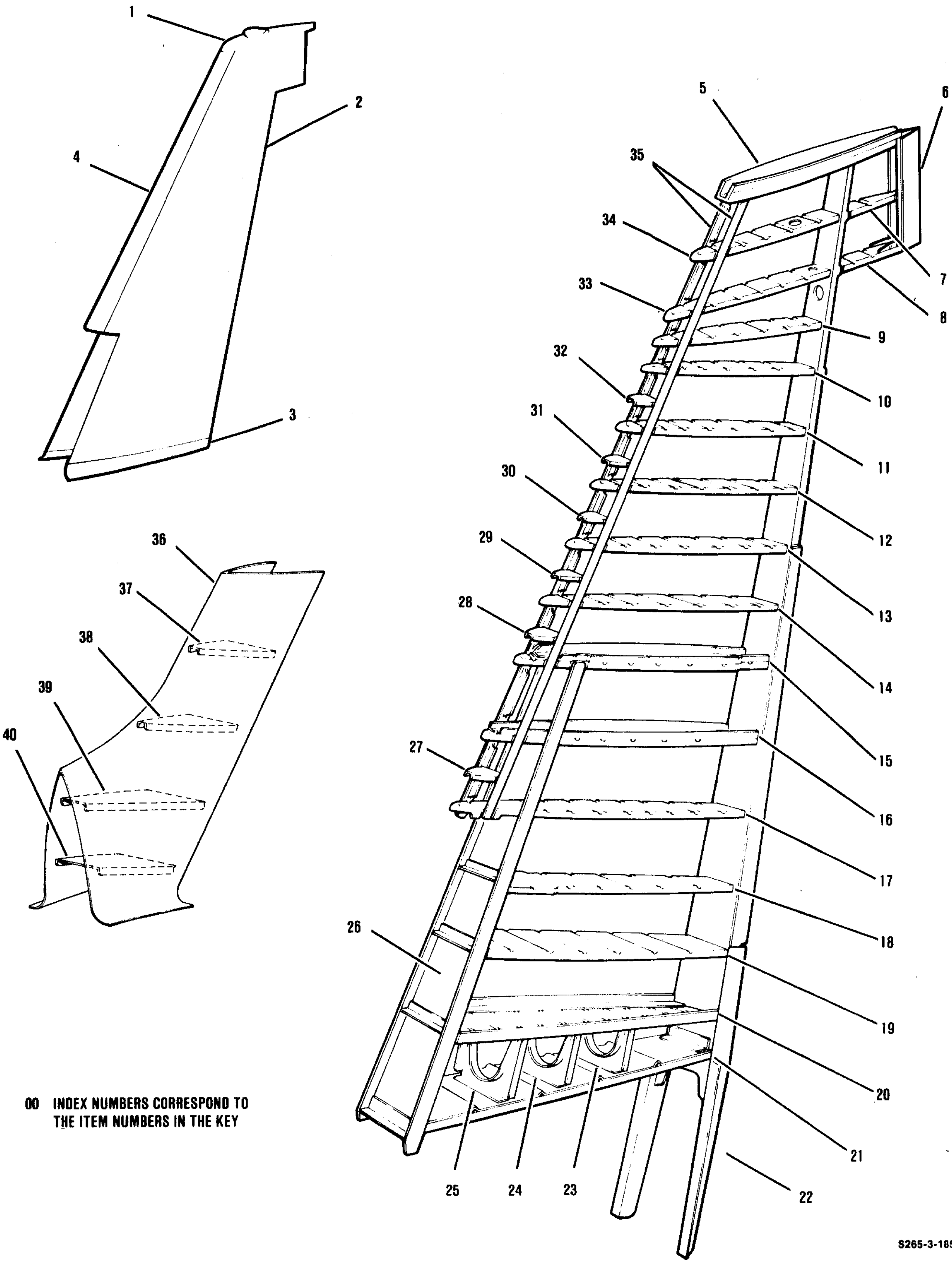
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-230003	Rib — Canted Sta — 2.875	7075-T6	1E863	55-30-20 Fig. 204
			7075-T6 Bare	0.090	
			7075-T6 Clad	0.032	
2	265-230005	Rib — Sta 0.520	7075-T6 Clad	4E745	55-30-20 Fig. 205
3	265-230008	Rib — Sta 8.795	7075-T6 Clad	0.032	55-30-20 Fig. 203
4	265-230017	Rib — Sta 17.070	7075-T6 Clad	0.032	55-30-20 Fig. 203
5	265-230025	Rib — Sta 25.345	7075-T6 Clad	0.050	
				0.032	
6	265-230033	Rib — Sta 33.625	7075-T6 Clad	0.040	
				0.032	
7	265-230040	Rib — Sta 40.175	7075-T6 Clad	0.025	55-30-20 Fig. 203
8	265-230046	Rib — Sta 46.725	7075-T6 Clad	0.025	
9	265-230053	Rib — Sta 53.275	7075-T6 Clad	0.025	
10	265-230059	Rib — Sta 59.825	7075-T6 Clad	0.025	
11	265-230066	Rib — Sta 66.375	7075-T6 Clad	0.032	
12	265-230072	Rib — Sta 72.170	7075-T6 Clad	0.020	
13	265-230079	Rib — Aft, Canted Sta 78.997	7075-T6 Clad	0.025	
14	265-230086	Rib — Aft, Canted Sta 85	2024-T4 Clad	0.020	55-30-20 Fig. 203
15	265-230320	Beam Assy — TE			
	265-230320-3	Facing Sheet	2024-T3 Clad	0.010	
	265-230320-5	Channel	2024-T42 Clad	0.020	
	265-230320-7	Core	Honeycomb	3/16 X 0.001	
16	265-230090	Rib — Canted Sta 90.375	2024-T4 Clad	0.020	
			2024-T42 Clad	0.020	
17	265-230085	Rib — Fwd, Canted Sta 85	2024-T4 Clad	0.020	55-30-20 Fig. 203
18	265-230078	Rib — Fwd, Canted Sta 78.997	7075-T6 Clad	0.020	55-30-20 Fig. 203
19	265-230408-1 and -2	Stringer	7075-T6 Bare	4E692	
20	265-230301	Beam Assy — Front			
	265-230301-3	Web	7075-T6 Bare	0.032	
	265-230407-1 and -2	Cap	7075-T6 Bare	4E691	
21	265-250014	Frame — Fillet, Upper	7075-T5 Clad	0.032	
22	265-250013	Frame — Fillet, Intermediate	7075-T5 Clad	0.032	
23	265-250012	Frame — Fillet, Lower	2024-T42 Clad	0.032	
24	265-230314	Intercostal — Fwd	7075-T6 Clad	0.032	
25	265-230315	Intercostal — Intermediate	7075-T6 Clad	0.032	
26	265-230302	Intercostal — Aft	7075-T6 Clad	0.032	
27	285-230302	Beam Assy — Rear			
	265-230402-1 and -2	Cap	7075-T6 Plate	0.375	
	265-230412	Web	7075-T6 Clad	0.071 A	
28	265-230421-1 and -2	Skin — Side	2024-T3 Bare	0.063 A	55-30-20 Fig. 203
29		Tip — Antenna	Laminated Glass Fabric		
30	265-230423	Skin — LE	2024-T4 Bare	0.032	55-30-20 Fig. 201
31	265-250002	Fillet — Fwd	6061-T4 Bare	0.032	
32	265-250003-1 and -2	Fillet — Side	2024-T42 Clad	0.020	

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variations.***

Key to Figure 1



Vertical Stabilizer Repair Index
Model NA 265-70, -80, -80A and -80SC
Figure 2

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	370-230311	Tip — Vertical Stabilizer	6061-T4 Bare	0.032	
2	370-230421-1 and -2	Skins — Vertical Stabilizer	2024-T3 Bare	0.063 A	55-30-20 Fig. 202
3	265-250003-1 and -2	Fillet — Side	2024-T42 Clad	0.020	
4	265-230423-3 and -5	Skin — LE	2024-T3 Bare	0.032	55-30-20 Fig. 201
5	265-230090	Rib — Canted Sta 90.375	2024-T42 Clad	0.020	
6	265-230320	Trailing Edge Assy			
	265-230320-3	Skin	2024T3 Clad	0.010	51-70-50 Fig. 204
	265-230320-7	Honeycomb Core	5052-H39	3/16 X 0.001	51-70-50 Fig. 203
7	265-230086	Rib — Canted Sta 85.000	2024-T42 Clad	0.020	55-30-20 Fig. 203
8	265-230079-3	Rib — Canted Sta 78.997	7075-T6 Clad	0.025	55-30-20 Fig. 203
9	265-230072	Rib — Canted Sta 72.170	7075-T6 Clad	0.020	55-30-20 Fig. 203
10	265-230066	Rib — Sta 66.375	7075-T6 Clad	0.032	55-30-20 Fig. 203
11	265-230059	Rib — Sta 59.825	7075-T6 Clad	0.025	55-30-20 Fig. 203
12	265-230053	Rib — Sta 53.275	7075-T6 Clad	0.025	55-30-20 Fig. 203
13	265-230046	Rib — Sta 46.725	7075-T6 Clad	0.025	55-30-20 Fig. 203
14	265-230040	Rib — Sta 40.175	7075-T6 Clad	0.025	55-30-20 Fig. 203
15	265-230033	Rib — Sta 33.625	7075-T6 Clad	0.040	55-30-20 Fig. 203
16	265-230025-11	Rib — Sta 25.345	7075-T6 Clad	0.050	55-30-20 Fig. 203
17	265-230017-11	Rib — Sta 17.070	7075-T6 Clad	0.032	55-30-20 Fig. 203
18	265-230008	Rib — Sta 8.795	7075-T6 Clad	0.032	55-30-20 Fig. 203
19	370-230005-11	Rib — Sta 0.520	7075-T6 Clad	0.032	55-30-20 Fig. 203
20	370-230004-11	Rib — Canted Sta 4.266	7075-T6 Clad	0.050	55-30-20 Fig. 205
21	370-230003-11	Rib — Canted Sta 8.269	7075-T5 Bare	0.090	55-30-20 Fig. 204
22	370-230302-11	Rear Beam Assy			
	370-230412-3	Web	7075-T6 Bare	0.071 A	
	370-230402-1 and -2	Cap	7075-T651 Bare	0.625	
23	370-230316-11	Intercostal — Aft	7075-T6 Clad	0.032	
24	370-230315-11	Intercostal — Intermediate	7075-T6 Clad	0.032	
25	370-230314-11	Intercostal — Fwd	7075-T6 Clad	0.032	
26	370-230301-11	Front Beam Assy			
	370-230301-3	Web	7075-T6 Clad	0.032	
	370-230407	Cap	7075-T6 Extr	4E691	
27	282-230021-1	Rib — LE, Sta 21.208	2024-T42 Clad	0.025	
28	282-230021-11	Rib — LE, Sta 36.900	2024-T42 Clad	0.025	
29	282-230021-21	Rib — LE, Sta 43.450	2024-T42 Clad	0.025	
30	282-230021-31	Rib — LE, Sta 50.000	2024-T42 Clad	0.025	
31	282-230021-41	Rib — LE, Sta 56.550	2024-T42 Clad	0.025	
32	282-230021-51	Rib — LE, Sta 63.100	2024-T42 Clad	0.025	
33	265-230078	Rib — Canted Sta 78.997	7075-T6 Clad	0.020	55-30-20 Fig. 203
34	265-230085	Rib — Canted Sta 85.000	2024-T42 Clad	0.020	55-30-20 Fig. 203
35	265-230408-11 & -12	Stringers	7075-T6Al Extr	4E692	
36	370-250002-3 and -4	Rib — Fillet,	6061-T4 Bare	0.032	
37	370-250015-11	Rib — Fillet, Sta 8.795	7075-T6 Clad	0.032	
38	370-250014-11	Rib — Fillet, Sta 0.520	7075-T6 Clad	0.032	
39	370-250013-11	Rib — Fillet, Sta 8.165	2024-T42 Clad	0.032	
40	370-250012-1 and-2	Rib — Fillet, Sta 15.559	2024-T42 Clad	0.032	

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***This is a chem-milled part. Measure thinned areas or refer to applicable drawing number for thickness variations.***

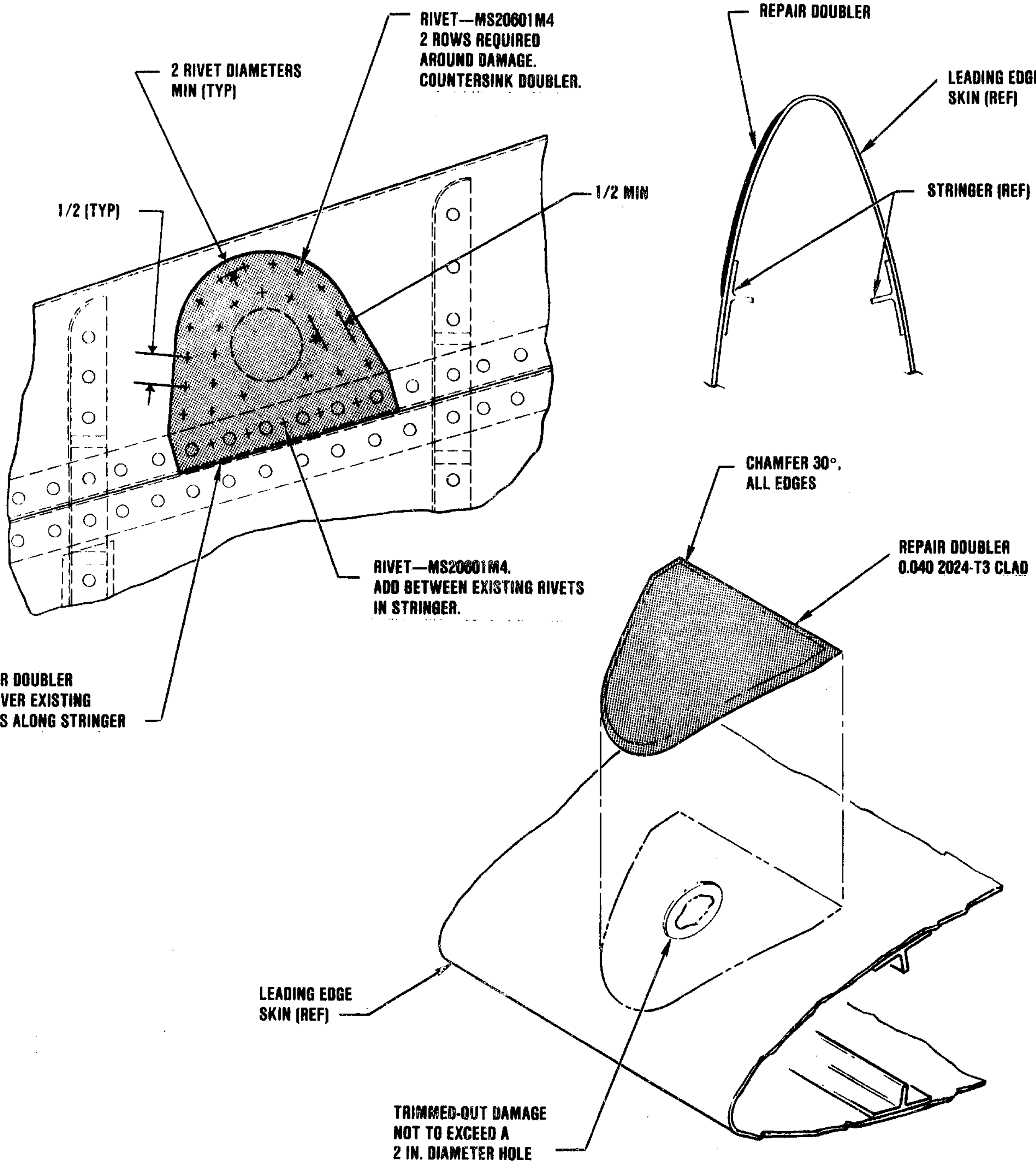
Key to Figure 2

VERTICAL STABILIZER

REPAIR

GENERAL

This section contains repairs for the vertical stabilizer.
For applicability of repairs, refer to 55-00-00.

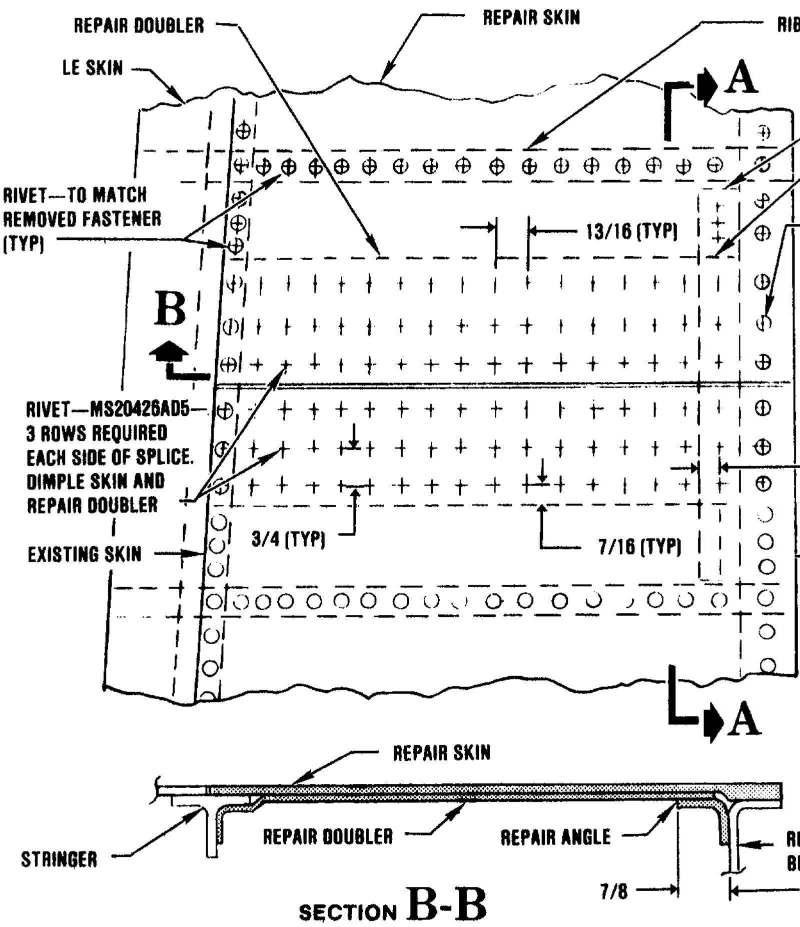


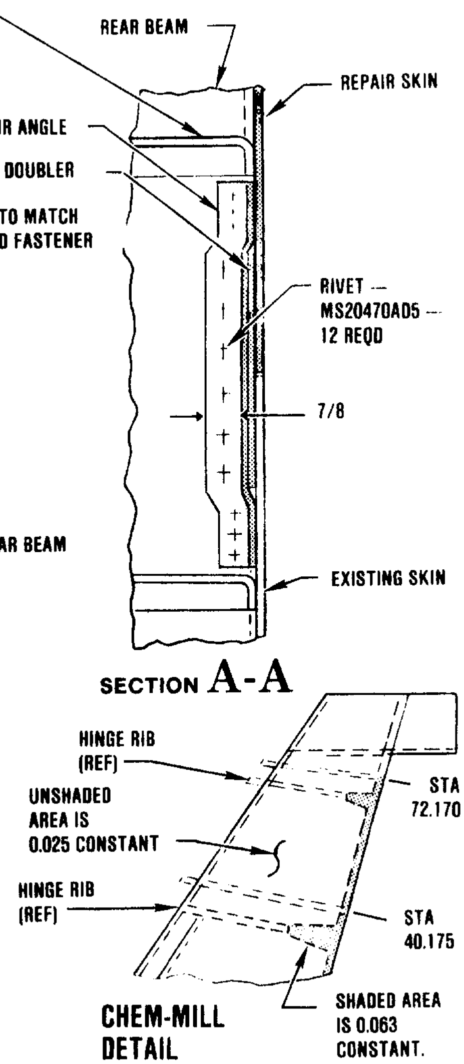
NOTE

THIS REPAIR MAY BE USED ON LEADING EDGE SKINS ON THE VERTICAL STABILIZER, RUDDER, AND ELEVATOR.

S265-3-195

Vertical Stabilizer, Rudder, and Elevator Leading Edge
Skin Repairs — Class B
Figure 201





1 Remove stabilizer leading edge skin.

2 Trim damaged side skin midway between ribs and between existing fasteners.

3 Fabricate repair parts.

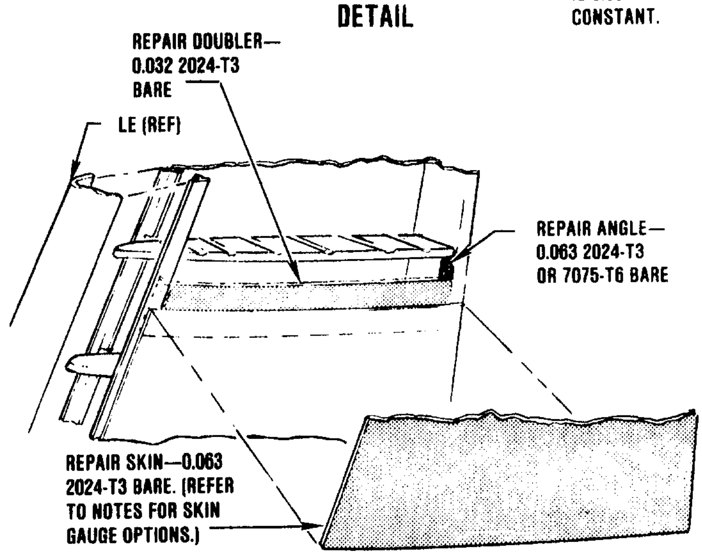
4 Prime repair angle and repair doubler.

5 Install repair parts and reinstall leading edge skin.

6 Refinish repaired surface to match surrounding areas.

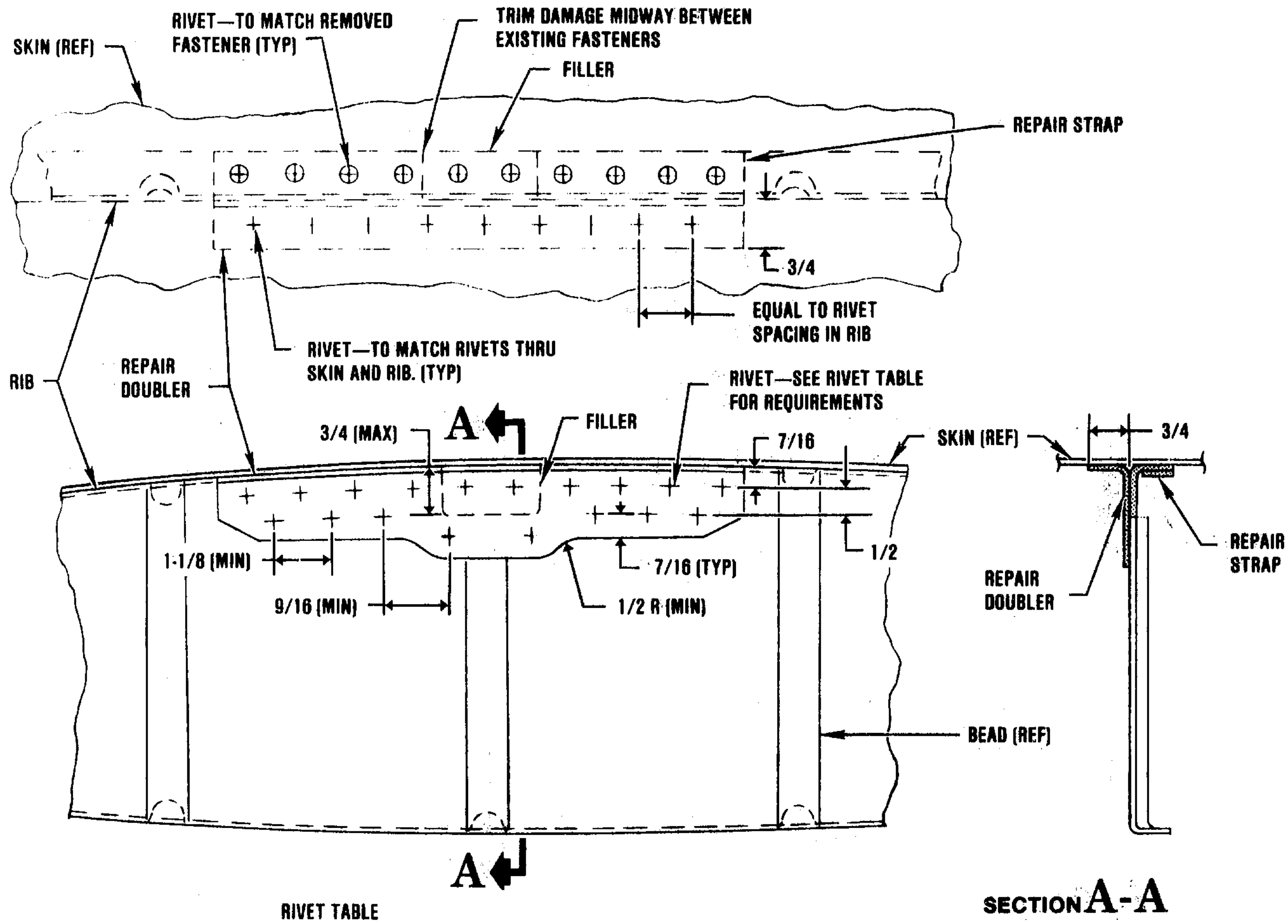
NOTES

- THIS REPAIR IS APPLICABLE TO BOTH SIDE SKINS
- SPLICES MUST BE MADE OUTBD OF STATION 40.175.
- REPAIR SKIN MUST BE 0.063 IN. MATERIAL MACHINED TO 0.025 IN. TO MATCH REMOVED SKIN SECTION (REFERENCE DWG 265-230421 OR 370-230421). WHEN DAMAGE IS INBD OF STATION 72.170 TWO SPLICES MAY BE MADE TO MINIMIZE THE MILLING OPERATION. (THE SKIN OUTBD OF STATION 72.170 IS ALL 0.025 IN.)
- A COMPLETE SKIN SPLICE IS SHOWN; HOWEVER, ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER MAY BE MADE, USING THE REPAIR DATA GIVEN.



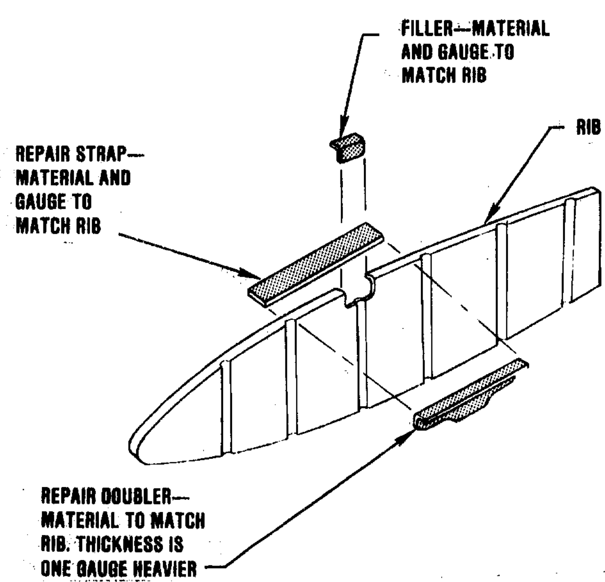
S265-3-205A

Vertical Stabilizer Side Skin Repairs
Figure 202



RIVET TABLE

VERT STAB STA	RIVET— MS20470	NO. REQUIRED EA SIDE OF FILLER
8.795	AD5	7
17.070	AD5	7
40.175	AD4	7
46.725	AD4	7
53.275	AD4	7
59.825	AD4	7
66.375	AD4	6
72.170	AD4	7
78.997	AD4	7
85.000	AD4	7



1 Trim out damage.

2 Fabricate repair parts.

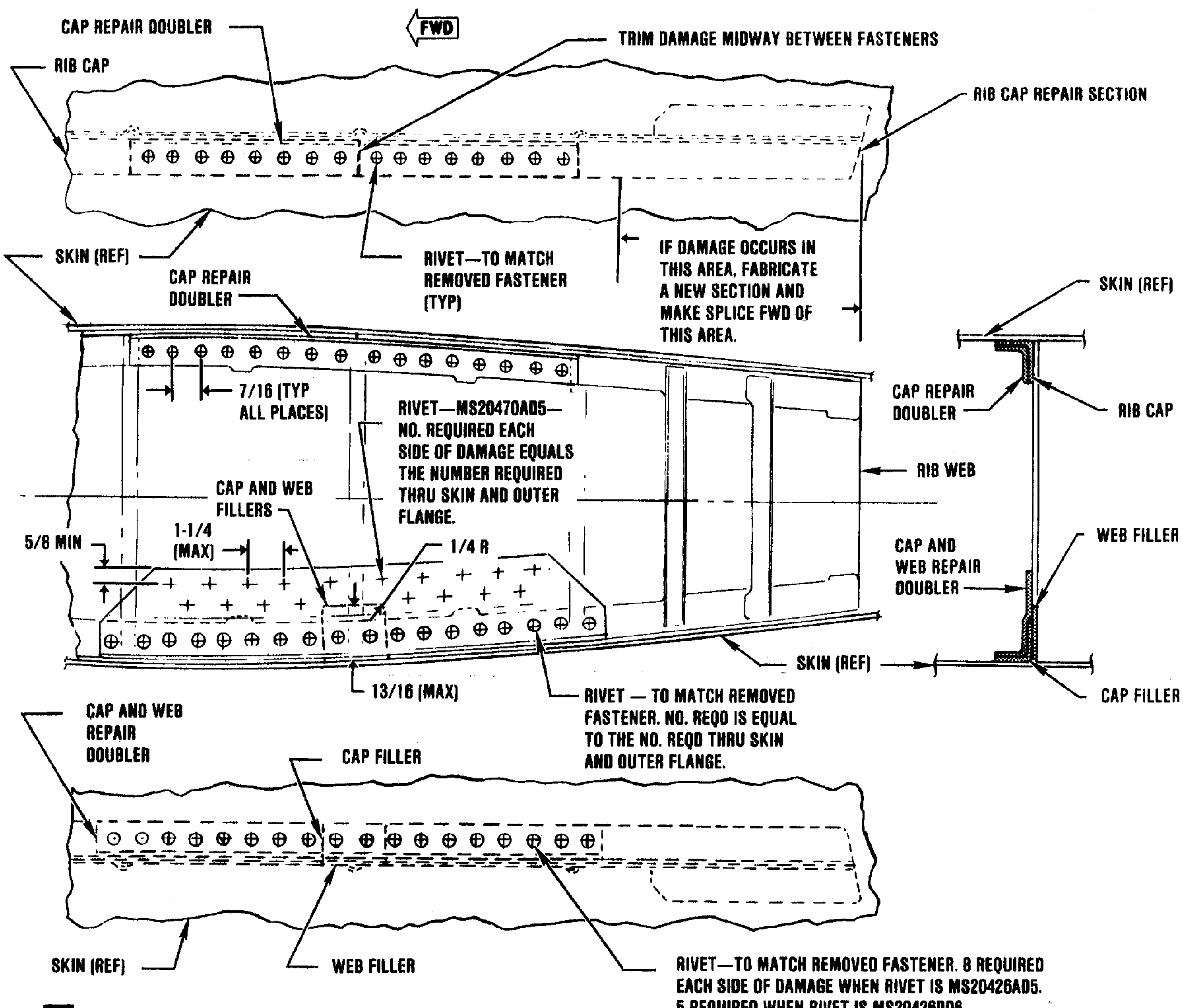
3 Install repair parts.

4 Prime completed repair.

NOTE

THIS REPAIR IS APPLICABLE TO VERTICAL STABILIZER RIBS AT STATIONS IN THE RIVET TABLE

Vertical Stabilizer Rib Repairs — General
Figure 203



1 Trim off damaged cap or trim out damaged cap and web area as applicable.

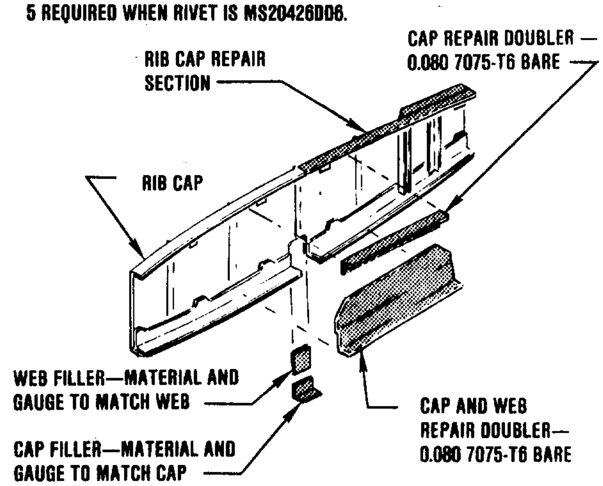
2 Fabricate repair parts. Form repair doublers from annealed material and heat-treat to the -T6 condition after forming.

3 Prime all bare parts.

4 Install repair parts.

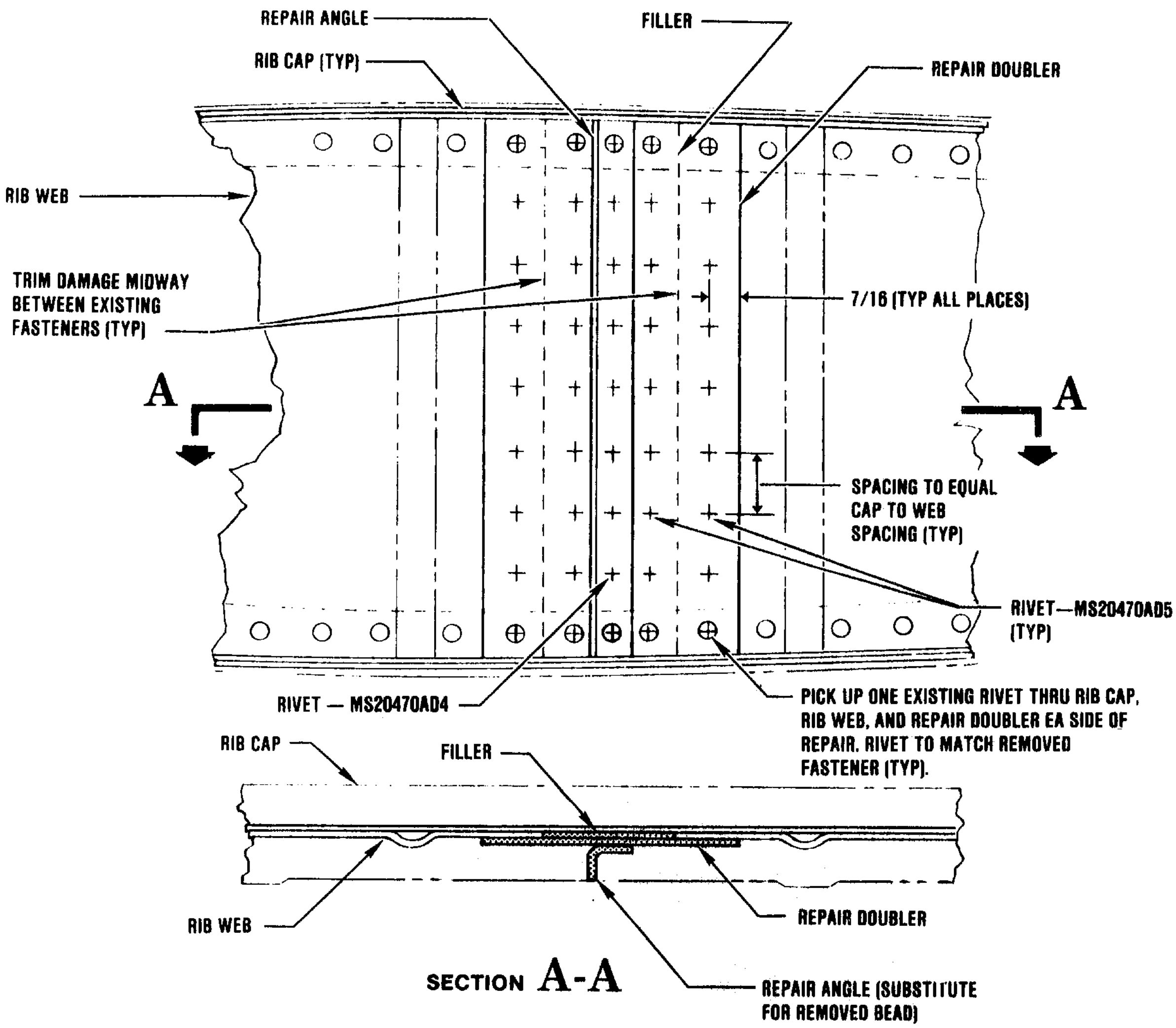
NOTE

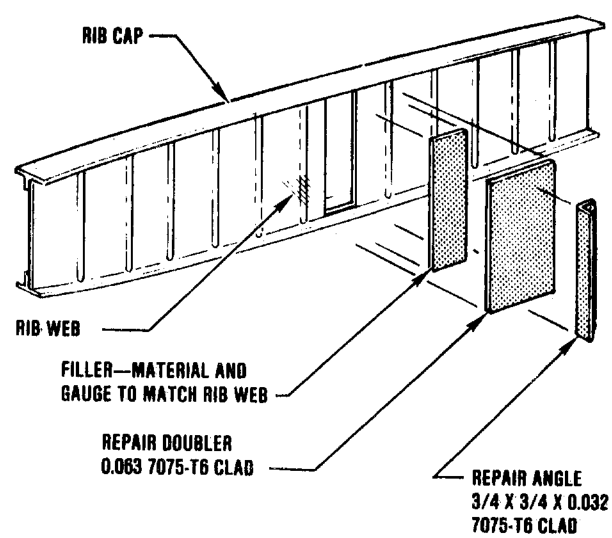
TWO REPAIRS ARE SHOWN. BOTH ARE APPLICABLE TO EITHER SIDE OF THE ROOT RIB (STATION 2.875).



S265-3-203

Vertical Stabilizer Rib Repair — Station 2.875
Figure 204





1 Trim out damaged rib web section.

2 Fabricate and install repair parts.

NOTES

- THIS REPAIR IS APPLICABLE TO THE WEB PORTION OF THE RIB ONLY. IF THE CAP IS DAMAGED, IT MUST BE REPLACED WITH AN EQUIVALENT EXTRUSION.
- A COMPLETE SPLICE IS SHOWN; HOWEVER, ANY SMALLER REPAIR THAT INCORPORATES A ONE-PIECE DOUBLER CAN BE MADE, USING THE DATA GIVEN.

S265-3-208

Vertical Stabilizer Rib Repair — Station 0.52
Figure 205

RUDDER

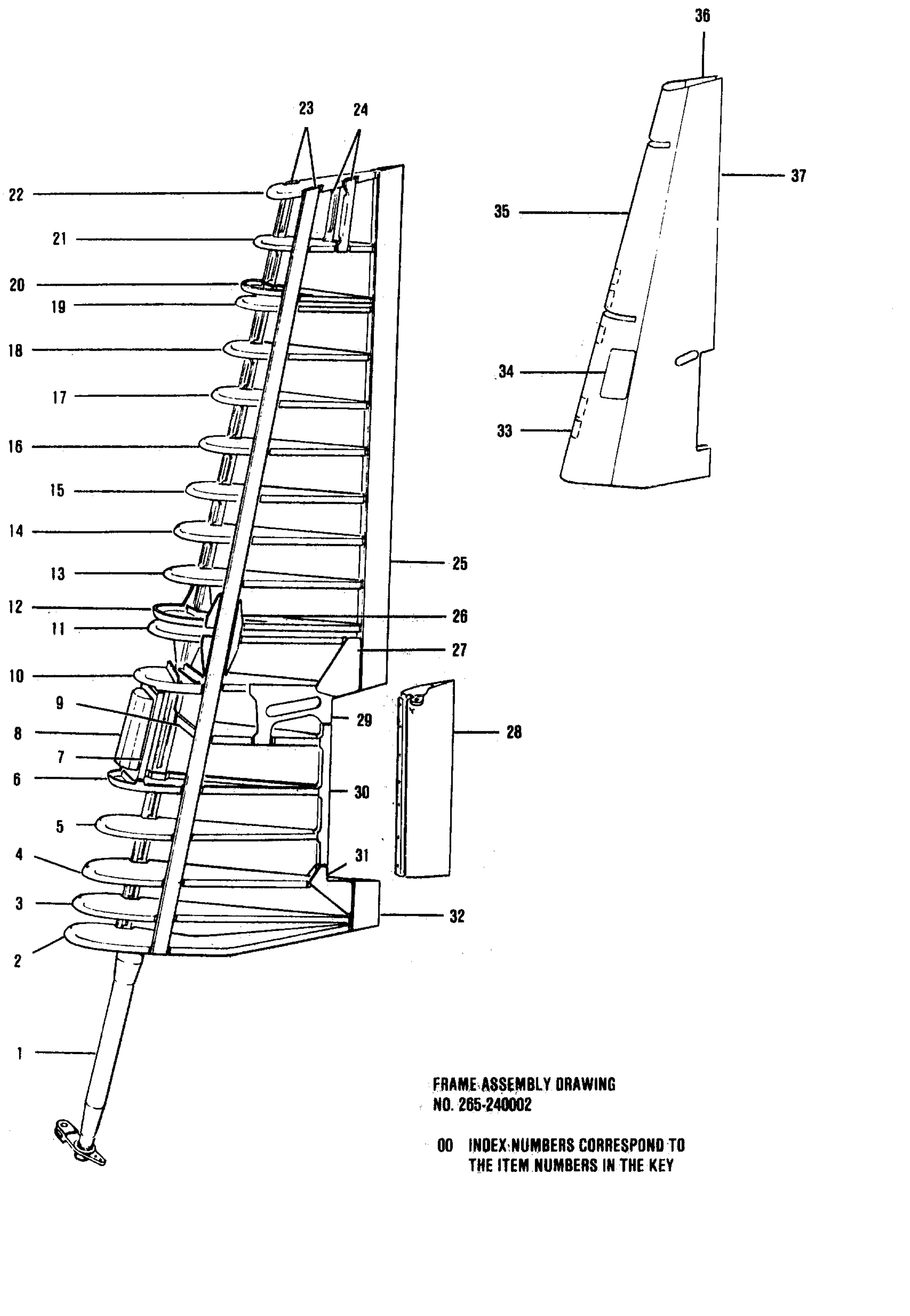
STRUCTURAL IDENTIFICATION

GENERAL

The information in this section applies to the rudder. For negligible damage limits, refer to 55-00-10. For repairs, refer to 55-30-20.

RUDDER REPAIR INDEX

See figure 1 for Model NA 265-40, -60, -60A, -60SC, and -65. See figure 2 for Model NA 265-70, -80, -80A and -80SC.



Rudder Repair Index — Model NA 265-40, -60, -60A, -60SC and -65
Figure 1

STRUCTURAL IDENTIFICATION (Continued)

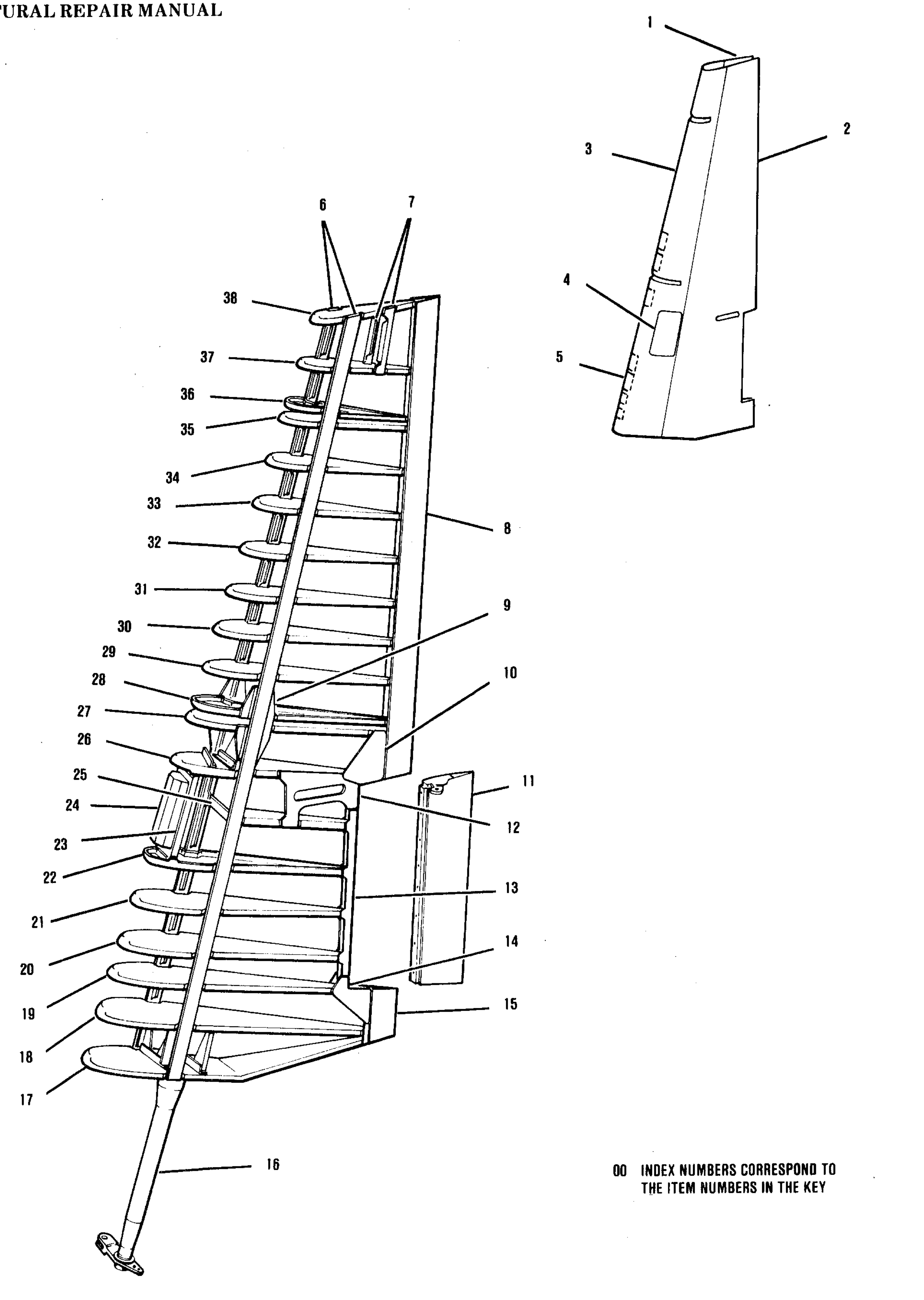
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-240003	Torque Tube Assy	2024-T42 Tube		
2	265-240005	Rib — Sta 2.625	7075-T6 Clad	0.032	55-40-20 Fig. 202, 203 204
3	265-240006	Rib — Sta 6.268	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
4	265-240009	Rib — Sta 9.693	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
5	265-240014	Rib — Sta 14.188	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
6	265-240018	Rib — Sta 18.094	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
7	265-240301	Channel	2024-T42 Clad	0.040	
8	265-240416	Weight — Balance	1018 Steel Bar	5/8	
9	265-240024	Rib — Sta 23.824	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
10	265-240028	Rib — Sta 28.930	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
11	265-240033	Rib — Sta 33.406	2024-T42 Clad	0.032	55-40-20 Fig. 202, 203
12	265-240034	Rib — Sta 34.218	2024-T42 Clad	0.032	55-40-20 Fig. 202, 203
13	265-240039	Rib — Sta 39.1	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
14	265-240043	Rib — Sta 43.140	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
15	246-24047	Rib — Sta 47.711	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
16	246-24052	Rib — Sta 52.282	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
17	246-24056	Rib — Sta 56.852	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
18	246-24061	Rib — Sta 61.424	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
19	265-240066	Rib — Sta 66.154	7075-T6 Clad	0.032	55-40-20 Fig. 202, 203
20	265-240067	Rib — Sta 66.966	2024-T42 Clad	0.032	55-40-20 Fig. 202, 203
21	246-24072	Rib — Sta 72.414	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
22	246-24077	Rib — Canted Sta 77.847	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
23	265-240411-1 and 2	Stringer	7075-T6 Extr	4E740	
24	265-240211-1 and 2	Stiffener	2024-T3 Clad	0.020	
25	265-240320-1	Beam Assy — TE			
	265-240320-3	Skin	2024-T3 Clad	0.010	
	265-240320-5	Channel	2024-T4 Clad	0.025	
	265-240320-7	Core	5052-H39 Honeycomb	3/16 X 0.001	
26	265-240002-7	Doubler	7075-T6 Clad	0.025	
27	265-240207	Doubler	2024-T4 Clad	0.032	
28	265-240501	Trim Tab Assy			
	265-240501-3	Skin	2024-T3 Clad	0.010	
	265-240501-5	Core	5052-H39 Honeycomb	3/16 X 0.001	
	265-240501-7	Channel	2024-T42 Clad	0.040	
	265-240501-9 and 11	Rib	7075-T6 Clad	0.050	
29	265-240206	Doubler	2024-T42 Clad	0.032	
30	265-240302	Beam Assy	2024-T42 Clad	0.020	
31	265-240203-1 and -2	Doubler	2024-T3 Clad	0.020	
32	265-240320-11	Beam Assy — TE Lower			
	265-240320-13	Skin	2024-T3 Clad	0.010	
	265-240320-15	Channel	2024-T4 Clad	0.020	
	65-240320-17	Core	5052-H39 Honeycomb	3/16 X 0.001	
33	265-240415-3, -5, -7, -9, and -11	Weight — Balance	1018 Steel	1/2	
34	265-240310	Door — Trim Tab Actuator	2024-T3 Clad	0.040	
35	265-240002-5	Skin — LE	2024-T3 Clad	0.040 A	55-40-20 Fig. 201, 202
36	265-240002-4	Skin — Right Side	2024-T3 Clad	0.020	55-40-20 Fig. 202, 203
37	265-240002-3	Skin — Left Side	2024-T3 Clad	0.020	55-40-20 Fig. 202, 203

NOTES

- ***For additional repairs, refer to 51-70-00.***

A ***Also refer to 55-30-20, Figure 201.***

Key to Figure 1



Rudder Repair Index — Model NA 265-70, -80, -80A, and -80SC
Figure 2

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	370-240101-1	Skin — RH Side	2024-T3 Bare	0.032	55-40-20 Fig. 201
2	370-240101-2	Skin — LH Side	2024-T3 Bare	0.032	55-40-20 Fig. 201
3	370 240002-3	Skin — LE	2024-T3 Clad	0.040	55-40-20 Fig. 201
4	265-240310-11	Door — LE Skin	2024-T3 Clad	0.040	
5	265-240415-3, -5 -7, -9, -11, -13 and -15	Weight — Rudder LE	1018 Steel	0.500	
6	370-240411-1 and -2	Stringer	7075-T6 Al Extr	4E74D	
7	265-240211-1 and -2	Support	2024-T3 Clad	0.020	
8	265-240320	Trailing Edge Assy — Upper			
	265-240320-19	Skin	2024-T42 Clad	0.020	
	265-240320-5	Channel	2024-T4 Clad	0.020	
9	370-240002-7	Doubler	7075-T6 Clad	0.025	
10	265-240207	Gusset RH	2024-T4 Clad	0.032	
11	370-240501	Trim Tab Assy			
	370-240501-3	Skin	2024-T3 Clad	0.010	51-70-50 Fig. 204
	370-240501-5	Honeycomb Core	5052-H39	3/16 X 0.010	51-70-50 Fig. 204
	370-240501-7	Channel	2024-T42 Clad	0.040	
12	265-240206	Gusset	2024-T42 Clad	0.032	
13	370-240302	Beam	2024-T42 Clad	0.020	
14	265-240002-5 and -6	Gusset	2024-T3 Clad	0.020	
15	265-240320-31	Trailing Edge Assy — Lower			
	265-240320-21	Skin	2024-T42 Clad	0.020	
	265-240320-15	Channel	2024-T4 Clad	0.020	
16	265-240408-3	Torque Tube Assy	2024-T42 Tube	0.091 Wall	
17	370-240004-11	Rib — Sta 2.856	7075-T6 Clad	0.050	55-40-20 Fig. 204
18	370-240005-3	Rib — Sta 1.780	2024-T42 Clad	0.025	55-40-20 Fig. 202, 203
19	370-240006-11	Rib — Sta 6.268	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
20	370-240009-3	Rib — Sta 9.693	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
21	265-240014	Rib — Sta 14.188	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
22	265-240018-3	Rib — Sta 18.094	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
23	265-240301	Support	2024-T42 Clad	0.040	
24	265-240416-3	Weight — Leading Edge	1018 Steel	0.625	
25	265-240024	Rib — Sta 23.824	2024-T42 Bare	0.020	55-40-20 Fig. 202, 203
26	265-240028	Rib — Sta 28.93	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
27	265-240033-3	Rib — Sta 33.406	2024-T42 Clad	0.050	55-40-20 Fig. 202, 203
28	265-240034-11	Rib — Sta 34.218	2024-T42 Clad	0.050	55-40-20 Fig. 202, 203
29	265-240039	Rib — Sta 39.100	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
30	265-240043	Rib — Sta 43.140	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
31	265-240047	Rib — Sta 47.711	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
32	246-24052	Rib — Sta 52.282	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
33	246-24056	Rib — Sta 56.853	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
34	246-24061	Rib — Sta 61.424	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
35	265-240066	Rib — Sta 66.154	7075-T6 Clad	0.032	55-40-20 Fig. 202, 203
36	265-240067	Rib — Sta 66.966	2024-T42 Clad	0.032	55-40-20 Fig. 202, 203
37	265-240072-11	Rib — Sta 72.414	2024-T42 Clad	0.020	55-40-20 Fig. 202, 203
38	246-24077-21	Rib — Canted Sta 77.847	2024-T42 Bare	0.025	55-40-20 Fig. 202, 203

NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 2

RUDDER

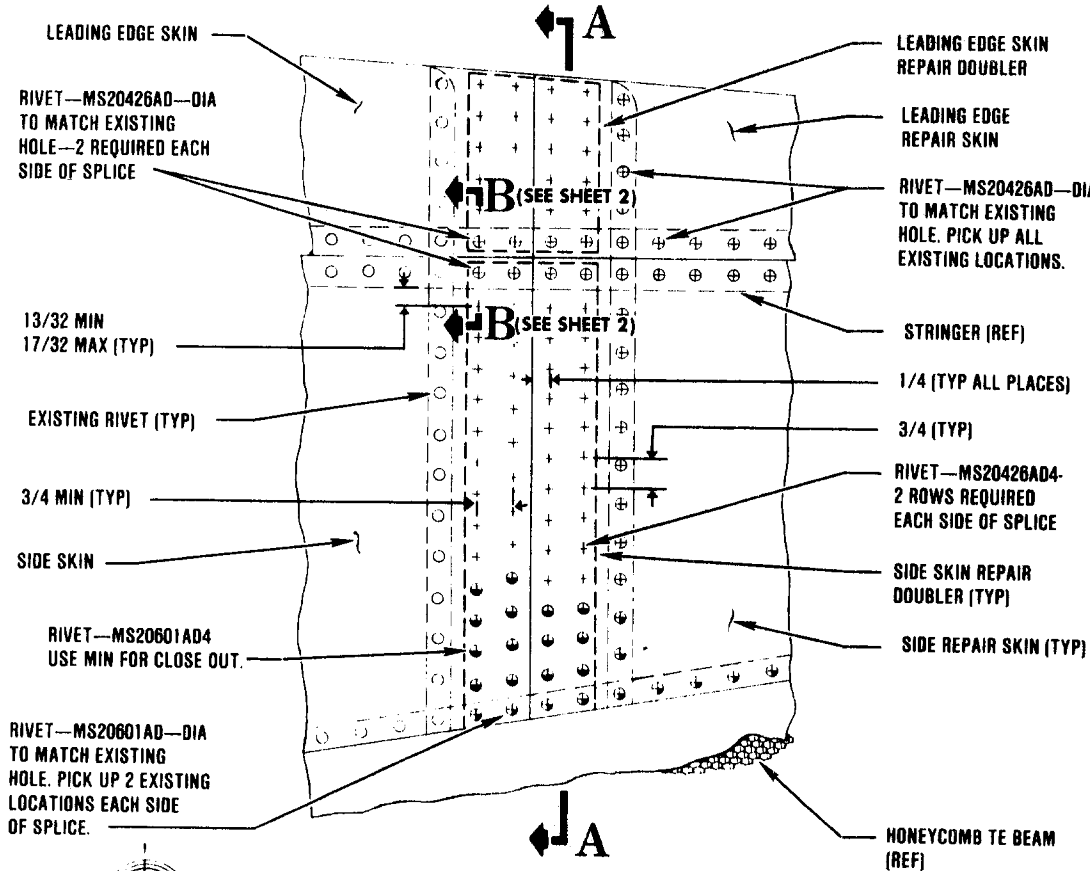
REPAIR

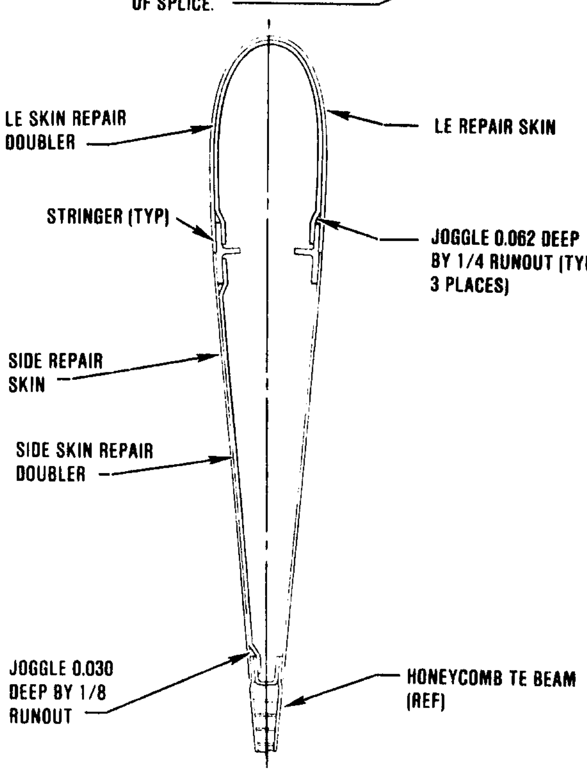
GENERAL

The section contains repairs for the rudder. For applicability of repairs, refer to 55-00-00.

RUDDER STATIC BALANCING

When a repair is done on the rudder, it is necessary that the surface be static balance checked. If the repaired surface is not within specified tolerances, the surface must be rebalanced. The procedures for checking static balance and the addition of weights are given in 55-10-20, figures 209-212. For rudder balance requirements, refer to figure 205.





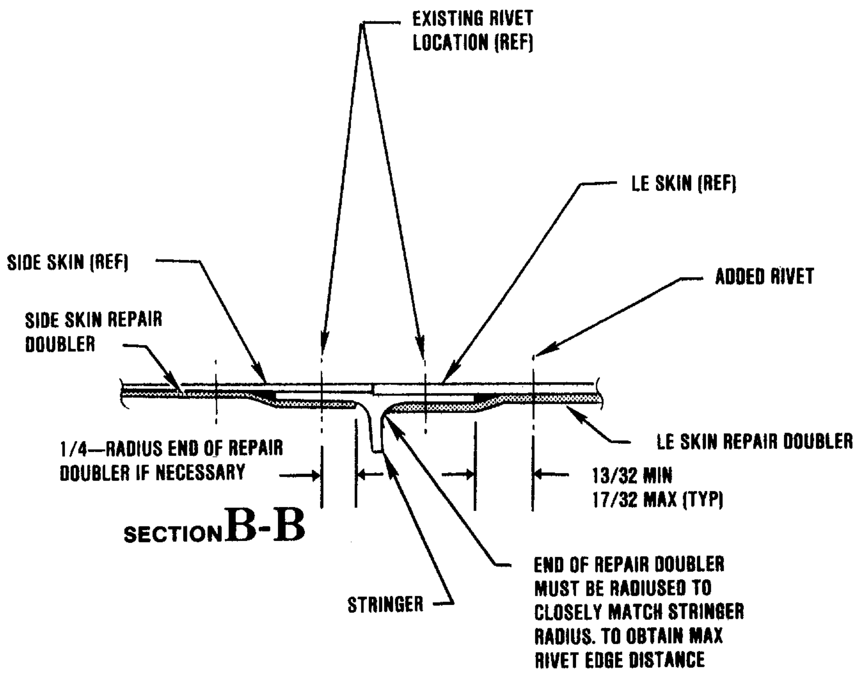
SECTION A-A

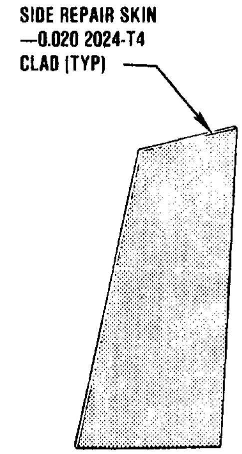
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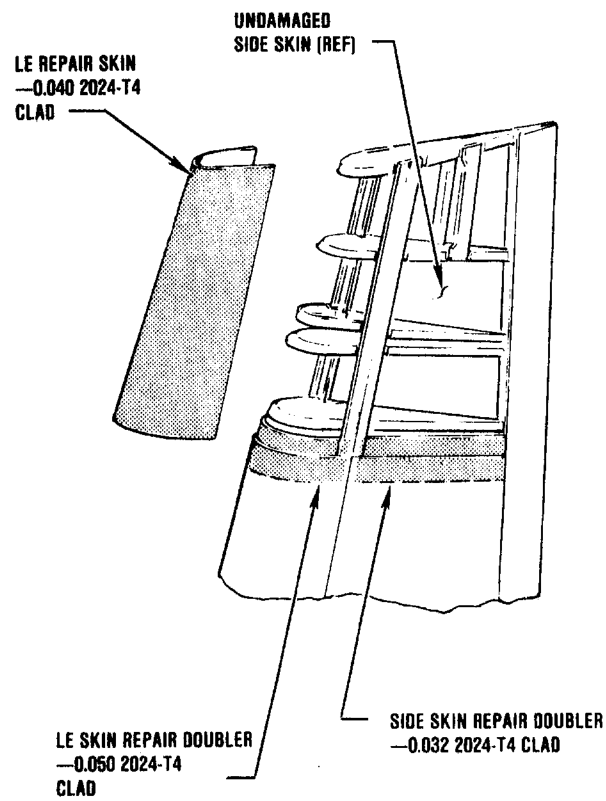
- THIS REPAIR IS APPLICABLE TO ALL AREAS OF THE RUDDER, EXCEPT (1) RIB BAYS ADJACENT TO HINGES AND (2) THE RIB BAY WHICH CONTAINS THE TRIM ACTUATOR ROD.
- ALL SKINS MAY BE SPLICED IN THE SAME RIB BAY, IF ALL REQUIRE SPLICING.
- WHEN SPLICING BOTH SIDE SKINS, USE MS20426AD RIVETS THROUGHOUT THE FIRST REPAIR SKIN AND REPAIR DOUBLER INSTALLED.

Rudder Leading Edge and Side Skin Repairs
Figure 201 (Sheet 1 of 2)

S265-3-209







1 Trim off damaged skin midway betwen ribs and between existing fasteners.

2 Fabricate repair doubler and repair skin. Joggles in repair doubler must fit close to substructure, to obtain rivet spacing tolerance.

3 Position repair doubler in place and drill all rivet holes through skin, substructure, and repair doubler. Position repair skin in place, and drill all required rivet holes.

4 Remove repair parts, and dimple all rivet holes except those inside countersunk substructure.

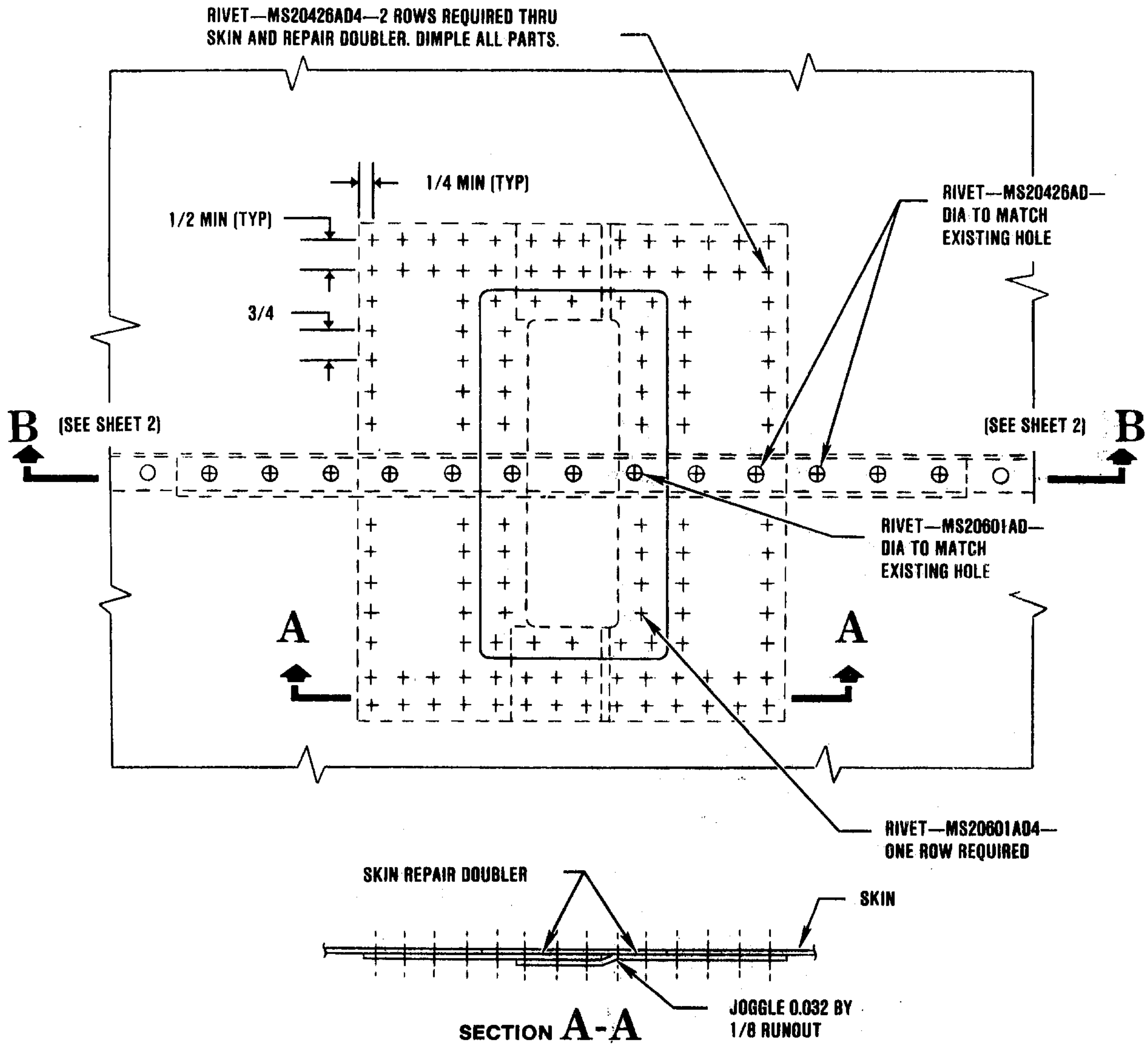
5 Reinstall repair parts, and rivet them in place. Rivet close-out side skin to stringer; continue riveting, progressing uniformly to the rear. Use minimum number of blind fasteners for close-out.

6 Refinish repair surface to match surrounding area.

7 Check rudder balance. If necessary, rebalance rudder. (Refer to "RUDDER STATIC BALANCING".)

S265-3-210

Rudder Leading Edge and Side Skin Repairs
Figure 201 (Sheet 2 of 2)

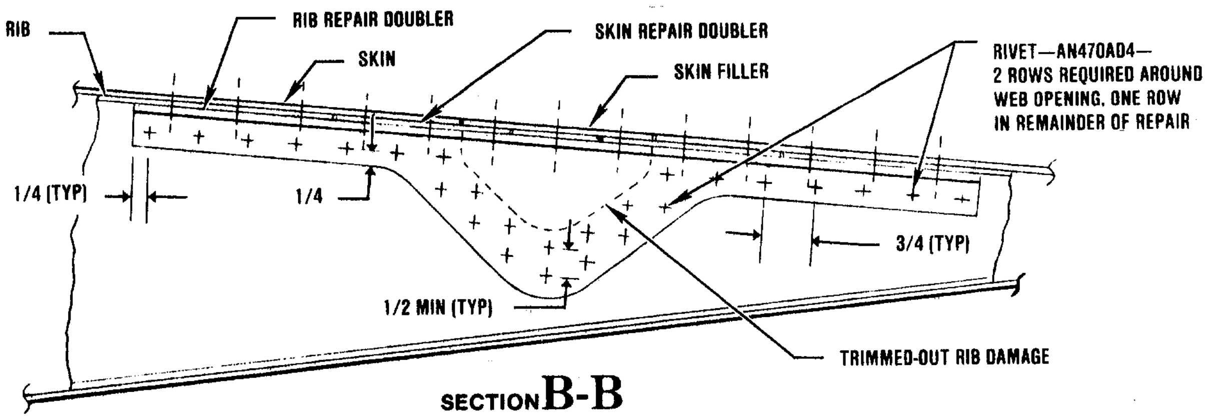


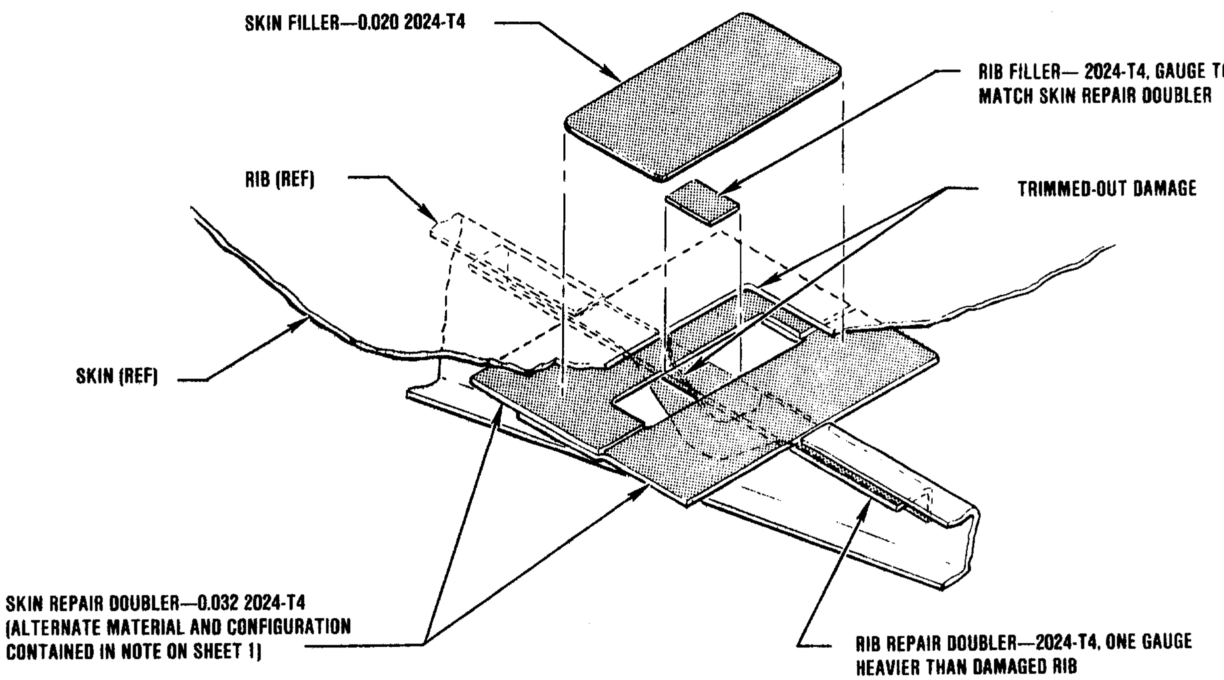
NOTES

- THIS REPAIR IS APPLICABLE TO ALL SIDE PANEL AREAS IF REPAIR DOUBLER OVERLAP REQUIREMENTS CAN BE MET.
- WHEN A SKIN REPAIR ONLY IS MADE ACROSS A RIB OR WHEN A RIB REPAIR IS MADE IN WHICH A RECESS IS NOT PROVIDED TO ACCOMODATE THE 0.032-IN. SKIN REPAIR DOUBLER, THE SKIN REPAIR DOUBLER MAY BE MADE FROM 0.016-IN., TYPE 301, 1/2H CORROSION-RESISTANT STEEL. THE USE OF THE THINNER MATERIAL MINIMIZES MOLD LINE BUMPING.
- A SINGLE-PIECE SKIN REPAIR DOUBLER MAY BE USED, WHEN ACCESSIBILITY PERMITS.

S265-3-211

Rudder Side Skin and Rib Repairs
Figure 202 (Sheet 1 of 2)





1 Trim out skin and rib damage midway between existing fasteners.

2 Remove additional rib flange, as necessary, to provide space to accommodate skin repair doubler.

3 Fabricate and install rib repair doubler.

4 Fabricate and temporarily install skin repair doubler. (Alternate skin repair doubler material and configuration information is contained in note on sheet 1.) Drill all holes through skin and skin repair doubler.

5 Fabricate and temporarily install filler. Drill all holes through filler and repair doublers.

6 Remove temporarily installed parts and dimple all holes.

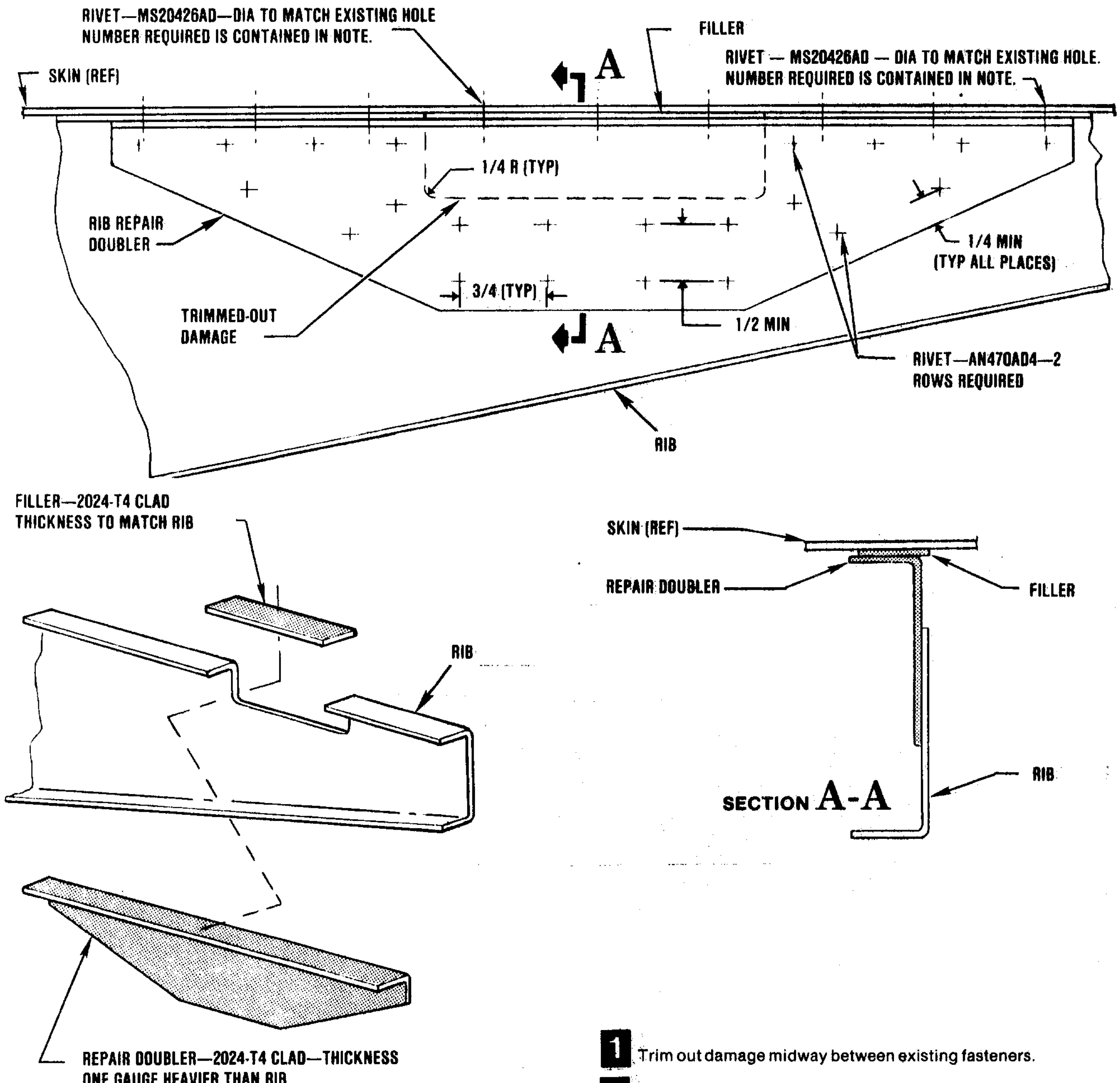
7 Reinstall parts and rivet them in place.

8 Refinish surface, so that it matches surrounding area.

9 Check rudder balance. If necessary, rebalance rudder. (Refer to "RUDDER STATIC BALANCING", this section.)

S265-3-212

Rudder Side Skin and Rib Repairs
Figure 202 (Sheet 2 of 2)



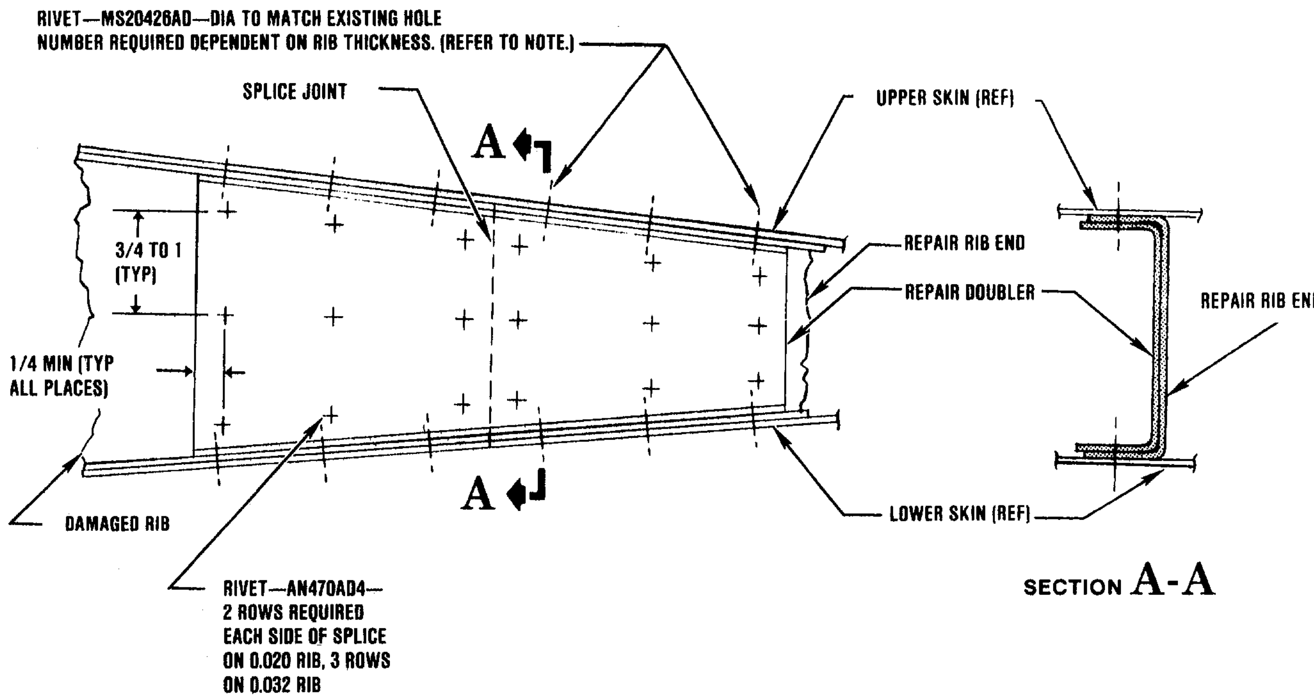
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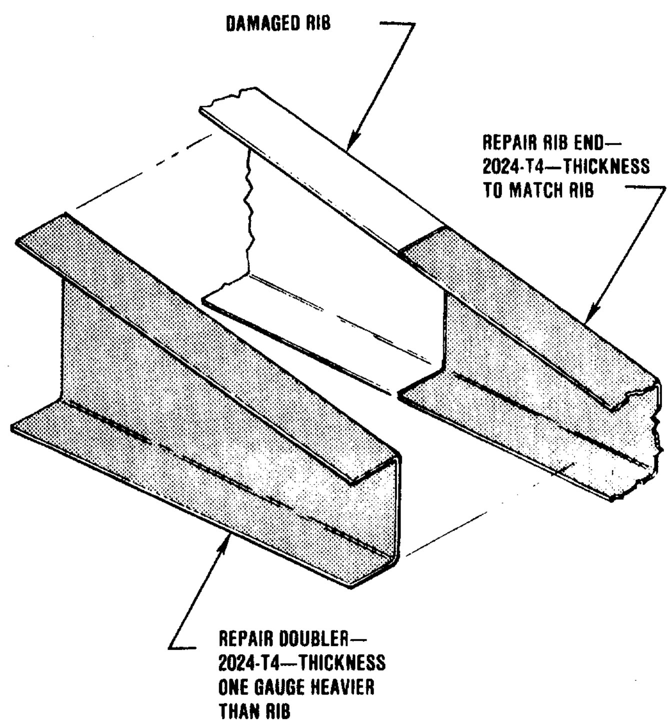
- THIS REPAIR MAY BE USED ON ALL RUDDER RIBS, IF PHYSICAL LIMITATIONS PERMIT.
- IF 0.032-IN. RIBS ARE BEING REPAIRED, PICK UP THREE EXISTING RIVET LOCATIONS ON EACH SIDE OF DAMAGE. IF 0.020-IN. RIBS ARE BEING REPAIRED, PICK UP TWO EXISTING RIVET LOCATIONS ON EACH SIDE OF DAMAGE.
- WHEN THIS REPAIR IS PART OF A BLIND SKIN AND RIB REPAIR, MS20601AD FASTENERS MAY BE USED THROUGH THE SKIN REPAIR FILLER AND RIB REPAIR FILLER.

1. Trim out damage midway between existing fasteners.
2. Fabricate and temporarily install repair doubler and filler. Drill all rivet holes.
3. Remove repair parts, and dimple holes in doubler flange and filler.
4. Reinstall parts, and rivet parts in place.
5. Check rudder balance. If rudder is not in balance, rebalance it. (Refer to "RUDDER STATIC BALANCING" this section.)

S265-3-213

Rudder Rib Repairs
Figure 203 (Sheet 1 of 2)





1 Trim off damaged rib end midway between existing fasteners.

2 Fabricate and temporarily install repair rib end and repair doubler. Drill all rivet holes.

3 Remove repair parts, and dimple holes in repair end and repair doubler flanges.

4 Reinstall repair parts, and rivet them in place.

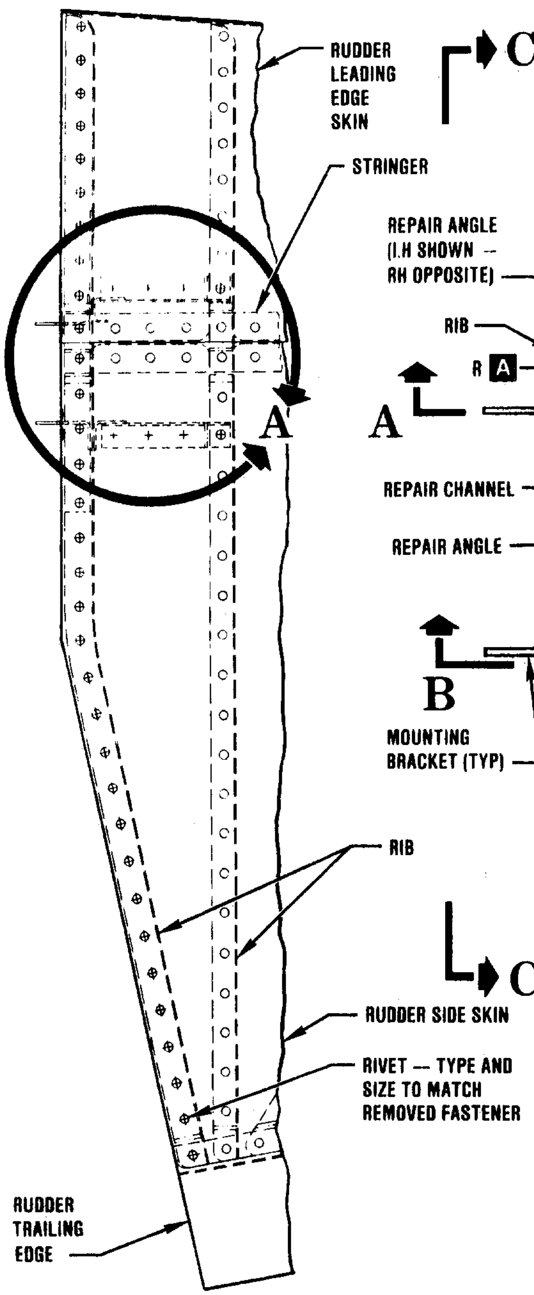
5 Check rudder balance. If necessary, rebalance rudder. (Refer to "RUDDER STATIC BALANCING", this section.)

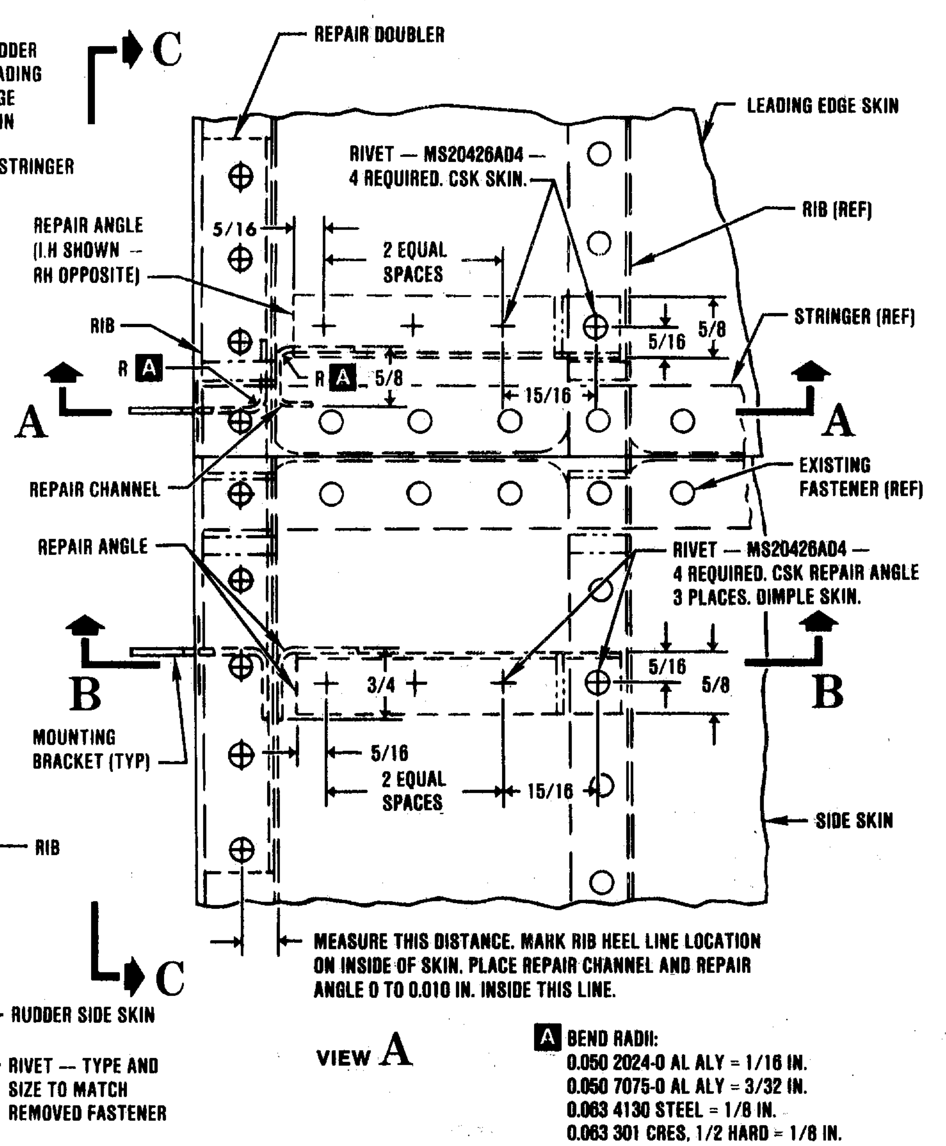
NOTES

- THIS REPAIR IS APPLICABLE TO ALL RUDDER RIBS.
- ON 0.032-IN. RIBS, PICK UP THREE EXISTING RIVET LOCATIONS EACH SIDE OF SPLICE; ON 0.020-IN. RIBS, PICK UP TWO EXISTING RIVET LOCATIONS EACH SIDE OF SPLICE.

S265-3-214

Rudder Rib Repairs
Figure 203 (Sheet 2 of 2)





NOTE

THIS REPAIR IS APPLICABLE TO THE RUDDER ROOT RIB (RUDDER STATION 2.625).

1 Remove rudder root rib.

2 Remove the two mounting brackets (torque tube) from root rib (save to use as templates for new brackets).

3 Fabricate root rib repair doubler. Heat-treat it to -T6 condition after forming.

4 Prime repair doubler.

5 Stop-drill all cracks in rudder root rib.

6 Install root rib repair doubler and back-drill mounting bracket and wire bundle clip attach holes.

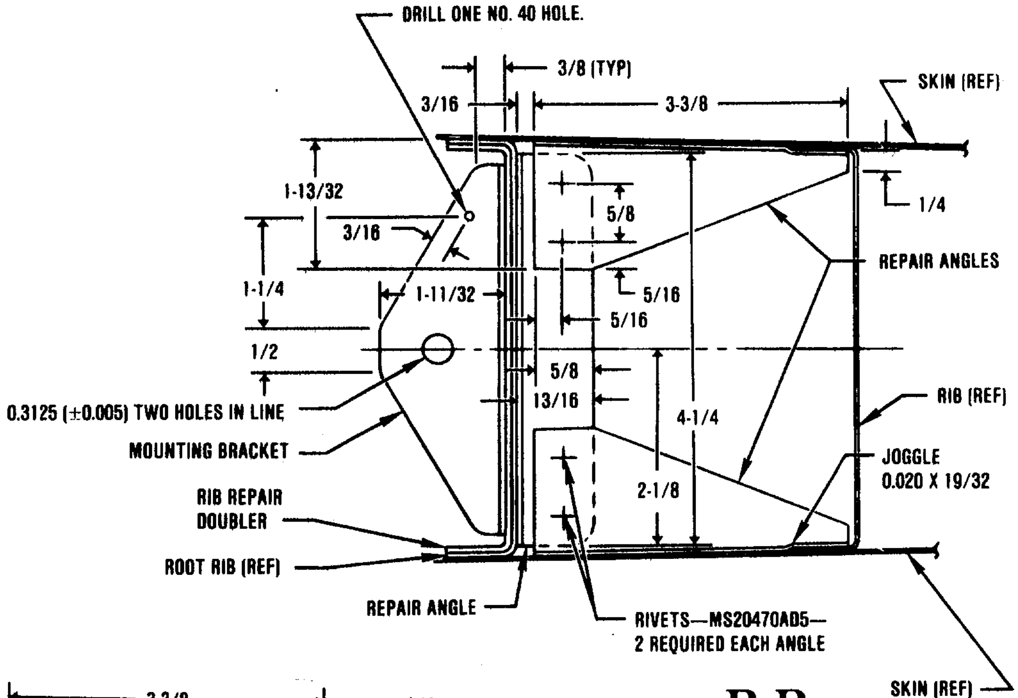
7 Fabricate all internal repair parts (channel and angles). Heat-treat parts to -T42 condition after forming.

8 Prime all internal repair parts.

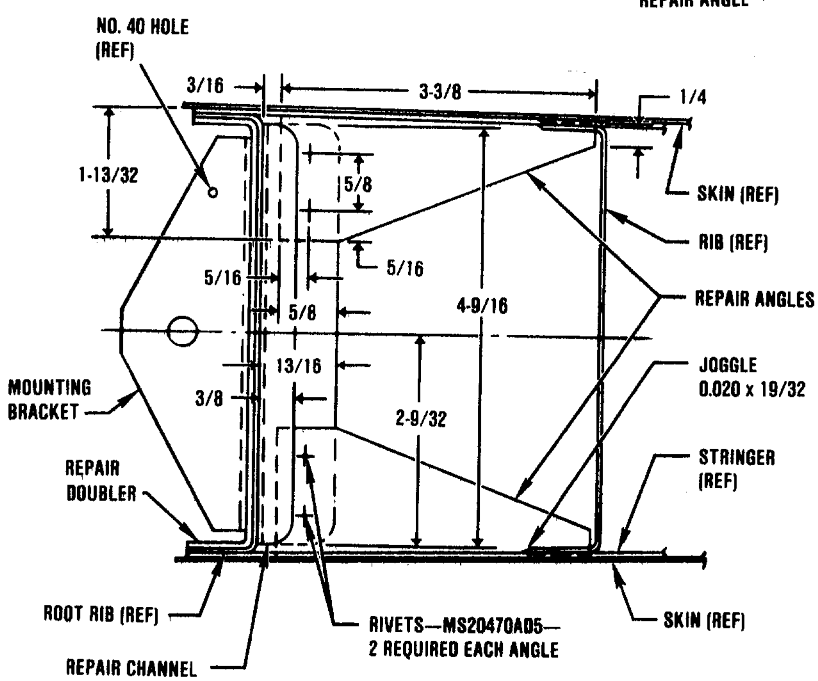
9 Carefully mark heel line position of root rib on inside of skins. (See view A.)

8265-3-215

Rudder Root Rib Repairs
Figure 204 (Sheet 1 of 3)



SECTION **B-B**



SECTION **A-A**

NOTE

HEAT- TREAT, CADMIUM-PLATE, AND PRIME BRACKETS MADE FROM 4130 STEEL. PRIME BRACKETS MADE FROM 301 CRES.

10 Position internal repair parts and temporarily hold them with 3/32 in. Cleco fasteners. (The chordwise channel angle should be 0 to 0.010 in. from the root rib heel line. See view A.)

11 Temporarily install root rib and check for proper alignment of internal repair parts. Realign and recheck parts as required.

12 Remove root rib and permanently install internal repair parts.

13 Install root rib.

14 Fabricate mounting bracket except for holes.

CAUTION

EXTREME CARE MUST BE TAKEN IN LOCATING HOLES IN THE NEW MOUNTING BRACKET TO ENSURE ALIGNMENT WITH THE RUDDER TORQUE TUBE.

15 Locate holes in new mounting brackets from those in the removed brackets. The 5/16-in. torque tube attach holes, however, must be 0.050 in. closer to the rib than they were in the original brackets (because of the 0.050 in. rib repair doubler.).

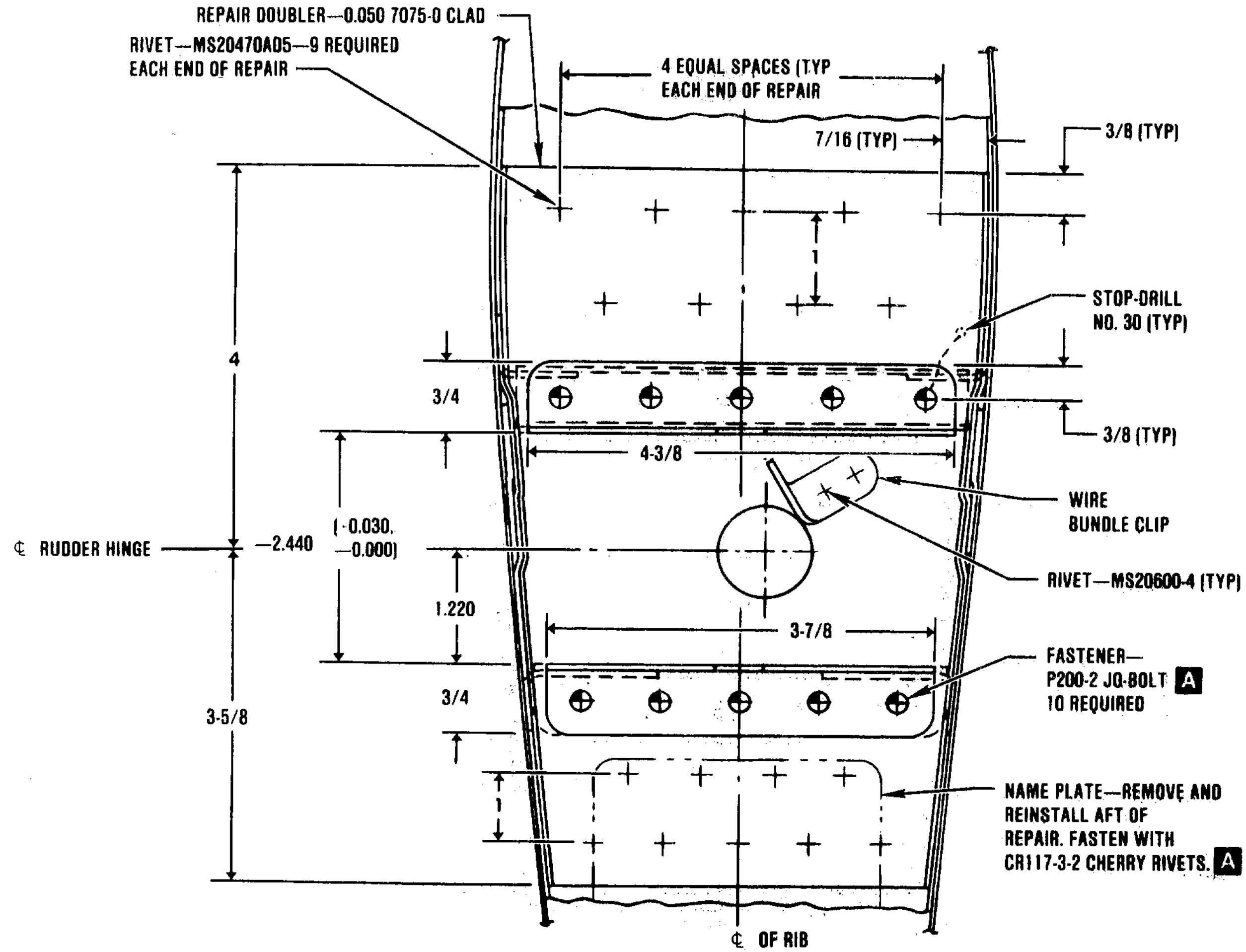
16 Install mounting brackets on rudder.

17 Reinstall wire bundle clip.

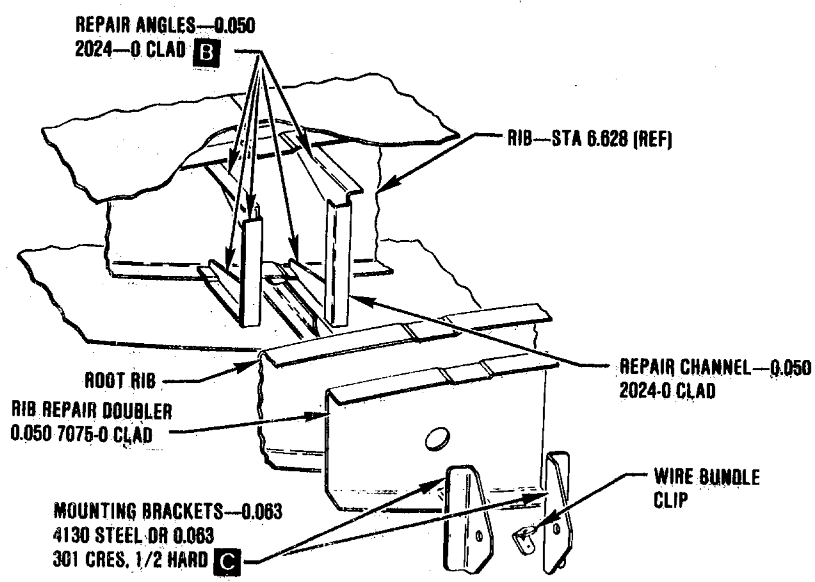
18 Refinish repaired areas of rudder to match surrounding areas.

S265-3-216A

Rudder Root Rib Repairs
Figure 204 (Sheet 2 of 3)



VIEW C-C



NOTES

- **A** REFER TO SOURCE CODE 026 IN 51-30-00.
- **B** HEAT-TREAT TO -T42 CONDITION AFTER FORMING.
- **C** HEAT-TREAT 4130 STEEL TO 125,000-140,000 PSI AFTER FORMING.

8265-3-217

Rudder Root Rib Repairs
Figure 204 (Sheet 3 of 3)

1 Place surface on support stand on a level bench. (See grooved bolt fabrication sketch, figure 209, 55-10-20.) Tape wire harness along hinge centerline.

2 Adjust pointer to height of hinge centerline; then place it adjacent to surface trailing edge. Support center hinge away from leading edge skin. Trailing edge of rudder should be even with pointer (0 balance) or below pointer (trailing edge heavy).

3 To determine actual rudder unbalance proceed as follows.

(a) Tape test weight container to rudder leading edge as shown in view "A."

(b) Add weights to container until rudder trailing edge is directly opposite pointer.

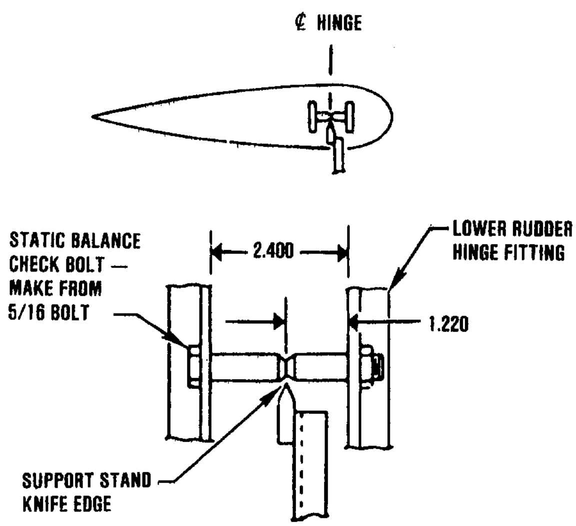
(c) Measure distance from center of container to rudder hinge line (L).

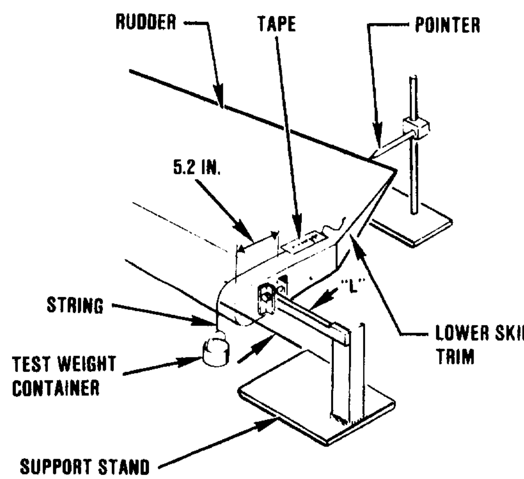
(d) Weigh test container and contents.

(e) Multiply weight by "L" dimension, to determine in.-lbs. of unbalance. The unbalance condition must be within tolerance shown on "RUDDER BALANCE REQUIREMENTS" chart or weights must be added to bring surface into balance condition. Refer to "ADDING BALANCE WEIGHTS", figure 211, 55-10-20.

RUDDER BALANCE REQUIREMENTS

RUDDER	BALANCE
265—240001-51,-101	0-5.25 IN-LB; T.E. HEAVY
-201, -211	0-5.25 IN-LB; T.E. HEAVY
& -301	0-5.25 IN-LB; T.E. HEAVY
370-240001-11	0-5 IN-LB; L.E. HEAVY





VIEW A
MODEL NA 265-40, -60, -60A, -60SC, AND -65

NOTES

- RUDDERS ON MODEL NA 265-40, -60, -60A, -60SC, AND -65 ARE BALANCED 0-5.25 IN.-LBS. TRAILING EDGE HEAVY.
- THE FOLLOWING REBALANCING PROCEDURES ARE FOR A COMPLETE RUDDER INCLUDING THE TRIM TAB, TRIM TAB ACTUATOR, STATIC WICKS AND FINAL PAINT.

S265-3-188B

Checking Rudder Static Balance
Figure 205 (Sheet 1 of 2)

1 Place surface on support stand on a level bench. (See grooved bolt fabrication sketch, figure 209, 55-10-20.) Tape wire harness along hinge centerline.

2 Adjust pointer to height of hinge centerline; then place it adjacent to surface trailing edge. Support center hinge away from leading edge skin. Trailing edge of rudder should be even with pointer (0 balance) or above pointer (nose heavy).

3 To determine actual rudder unbalance, proceed as follows.

(a) Tape test weight container to rudder trailing edge as shown in view "B."

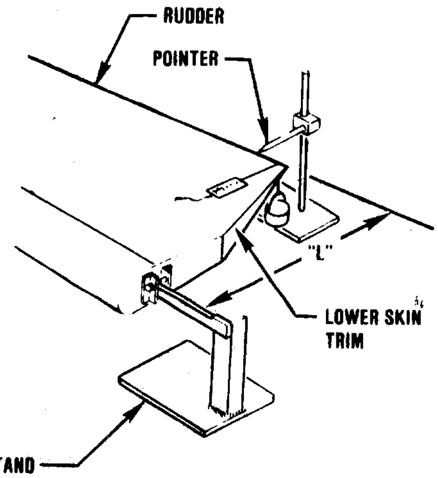
(b) Add weights to container until rudder trailing edge is directly opposite pointer.

(c) Measure distance from center of container to to rudder hinge line (L).

(d) Weigh test container and contents.

(e) Multiply weight by "L" dimension, to determine in. lbs. of unbalance. The unbalance condition must be within tolerance shown on "RUDDER BALANCE REQUIREMENTS" chart or weights must be added to bring surface into balance condition. Refer to "ADDING BALANCE WEIGHTS", figure 211, 55-10-20.

(f) If rudder assumes a trailing edge down attitude, the rudder balance is unacceptable and weights must be added. Tape a test weight container to leading edge of the rudder as shown in View A. Add weights to test weight container until trailing edge matches up with pointer. Total weight of test weight container and added weight determine how much weight must be added to bring rudder into proper balance.



VIEW B
MODEL NA 265-70, -80, -80A, AND -80SC

NOTES

- RUDDERS ON MODEL NA 265-70, -80, -80A, AND -80SC ARE BALANCED 0 TO 5 IN.-LBS. NOSE HEAVY.
- THE FOLLOWING REBALANCE PROCEDURES ARE FOR A COMPLETE RUDDER INCLUDING THE TRIM TAB, TRIM TAB ACTUATOR, STATIC WICKS AND FINAL PAINT.

S265-3-188B

Checking Rudder Static Balance
Figure 205 (Sheet 2 of 2)

CHAPTER

56

WINDOWS

CHAPTER 56

WINDSHIELDS AND WINDOWS

TABLE OF CONTENTS

CHAPTER 56

WINDSHIELDS AND WINDOWS

LIST OF ILLUSTRATIONS

CHAPTER 56

WINDSHIELDS AND WINDOWS

LIST OF EFFECTIVE PAGES

* The asterisk indicates pages revised, added, or deleted by the current revision.

WINDSHIELDS AND WINDOWS

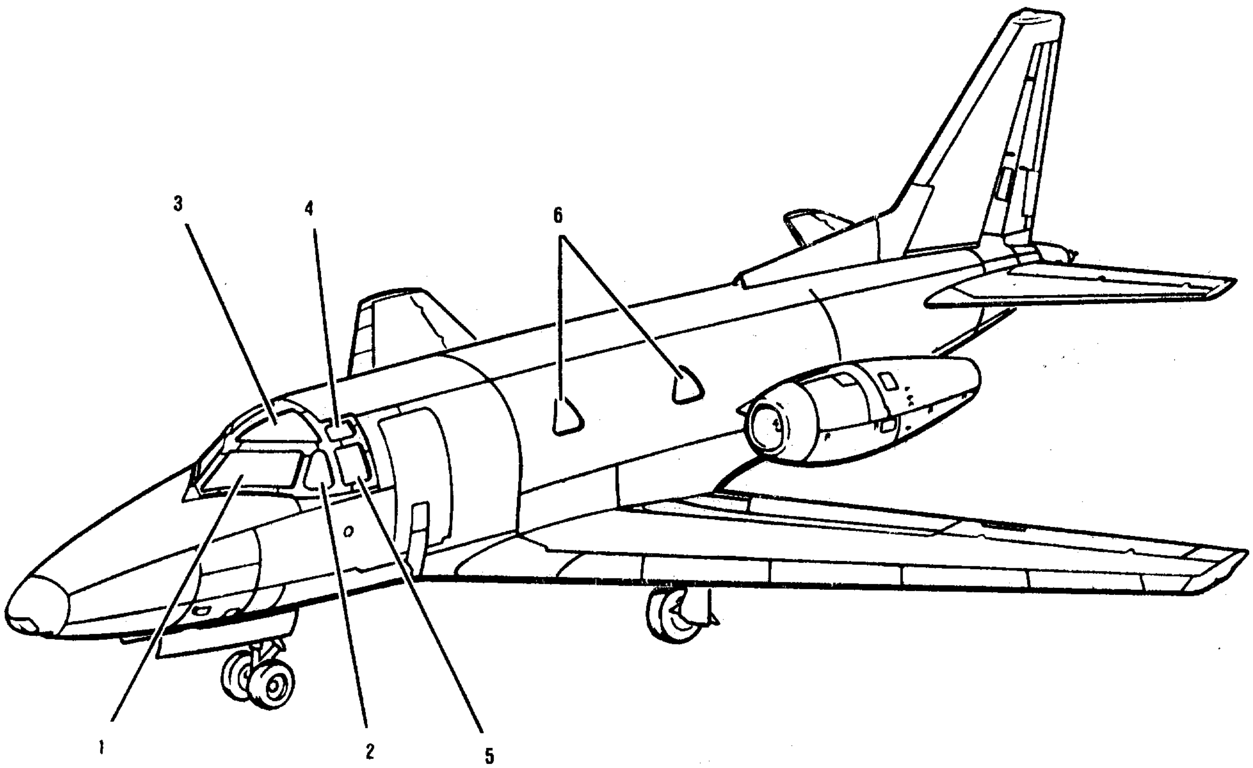
STRUCTURAL IDENTIFICATION

GENERAL

This chapter contains repairs and negligible damage limits for the windshields and windows.

MASTER REPAIR INDEX

See figure 1 for model NA 265-40, -60, -60A, -60SC and -65. See figure 2 for model NA 265-70, -80, -80A, and -80SC.

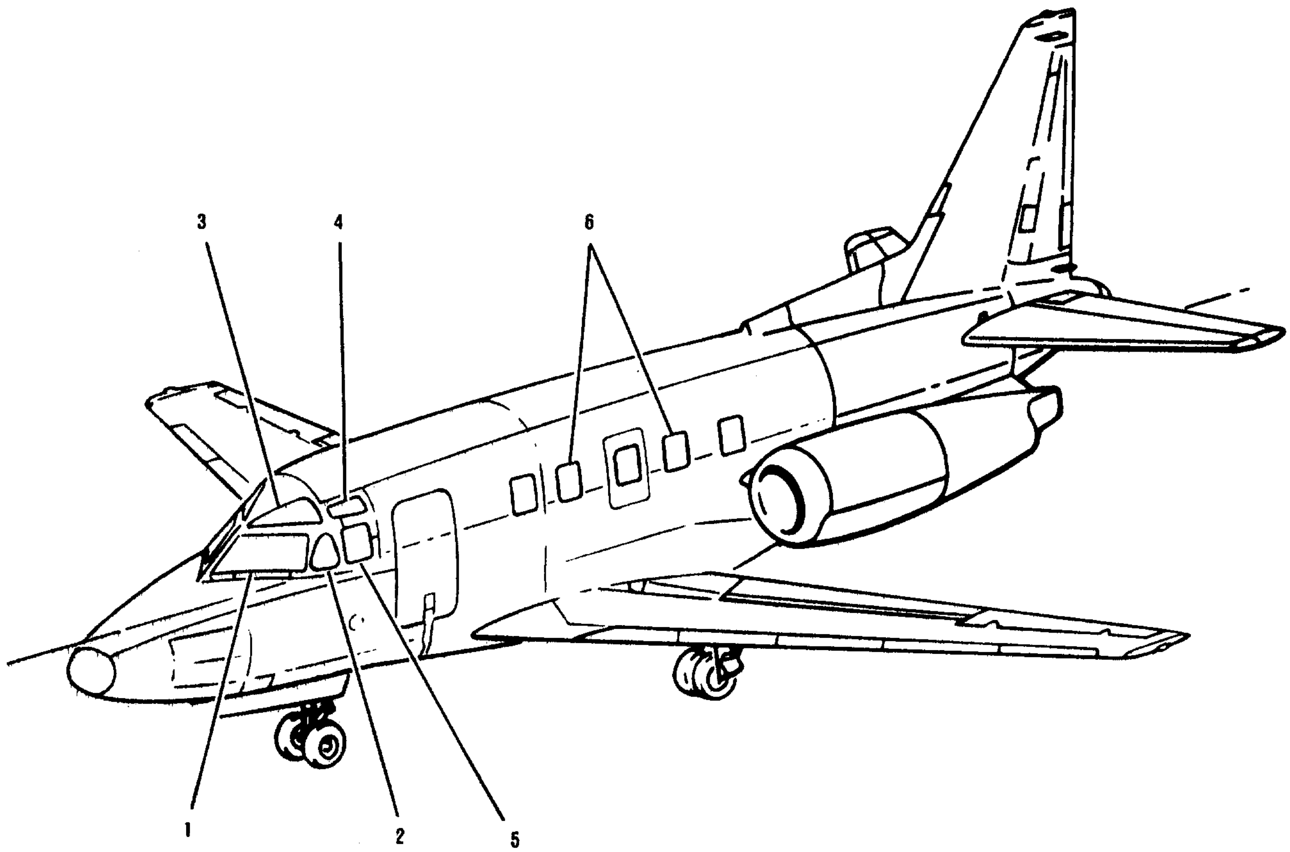


ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	REPAIR FIGURE NO.
1	E-1117	PLASTIC WINDSHIELD	ACRYLIC	56-10-20, FIG 201
1	265-318202	GLASS WINDSHIELD	GLASS	
2	265-318372	CORNER WINDOW	ACRYLIC	
3	265-318205	EYEBROW WINDOW	ACRYLIC	
4	265-318206	UPPER AFT COCKPIT WINDOW	ACRYLIC	
5	265-318204	LOWER AFT COCKPIT WINDOW	ACRYLIC	
6	265-300050	CABIN WINDOWS	ACRYLIC	

NOTE

FOR ADDITIONAL REPAIRS, REFER TO 51-70-00.

Windshields and Windows Master Repair Index
Model NA 265-40, -60, -60A, -60SC, and -65
Figure 1



ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	REPAIR FIGURE NO.
1	265-318202-31 & -32	GLASS WINDSHIELD	GLASS	
2	265-318372-51 (LH)	CORNER WINDOW	ACRYLIC	
	265-318208-11 (RH)	CORNER WINDOW	ACRYLIC	
3	370-318205-11 & -12	EYEBROW WINDOW	ACRYLIC	56-10-20, FIG 201
4	370-318206-11 & -12	UPPER AFT COCKPIT WINDOW	ACRYLIC	
5	370-318204-11 & -12	LOWER AFT COCKPIT WINDOW	ACRYLIC	
6	265-300050	CABIN WINDOWS	ACRYLIC	

NOTE

FOR ADDITIONAL REPAIRS, REFER TO 51-70-00.

S265-3-213

Windshields and Windows Master Repair Index
Model NA 265-70, -80, -80A, and -80SC
Figure 2

WINDSHIELDS AND WINDOWS

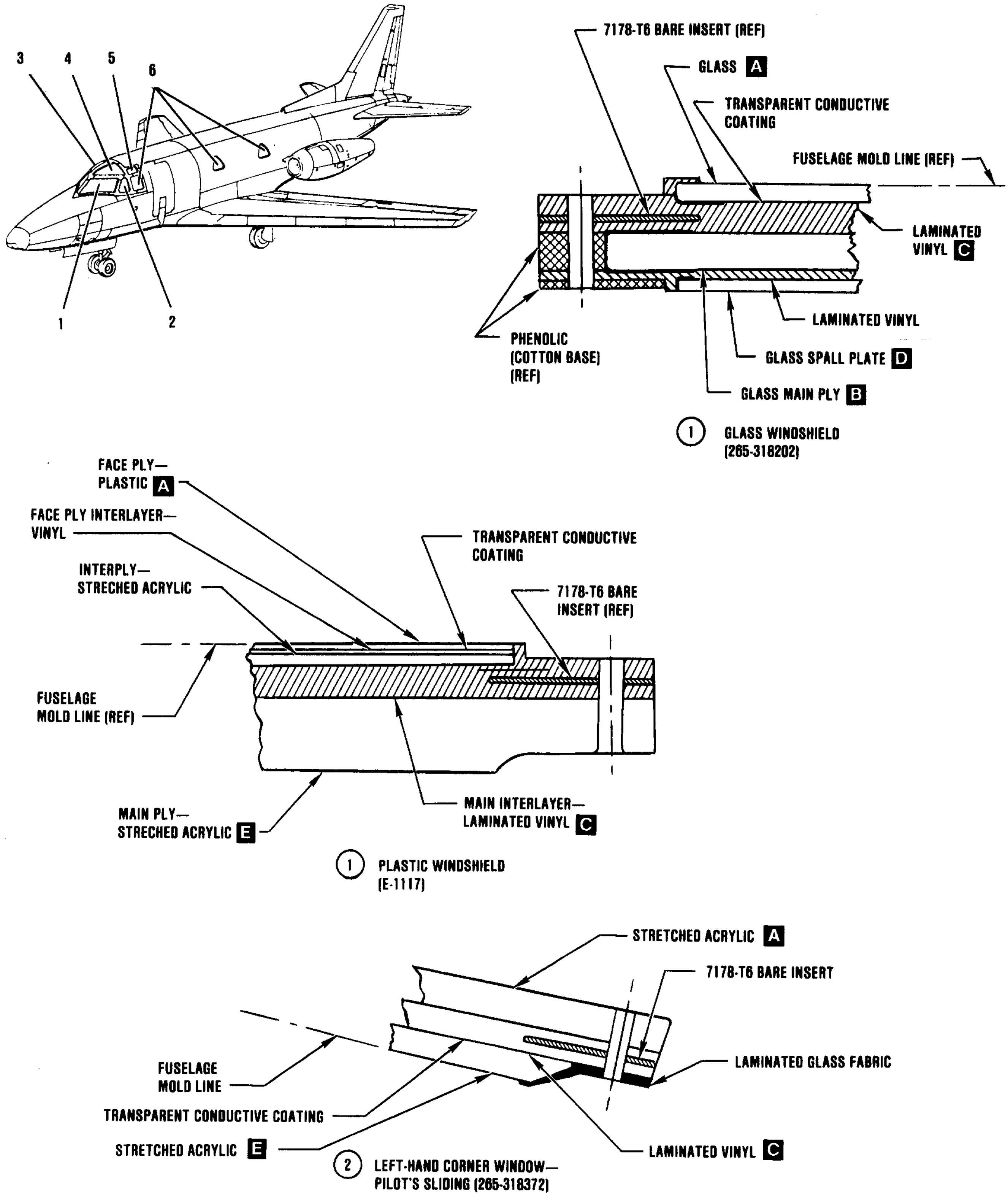
ALLOWABLE DAMAGE

GENERAL

This section contains negligible damage limits for the windshields and windows.

NEGLIGIBLE DAMAGE LIMITS

For negligible damage limits, see figure 101.

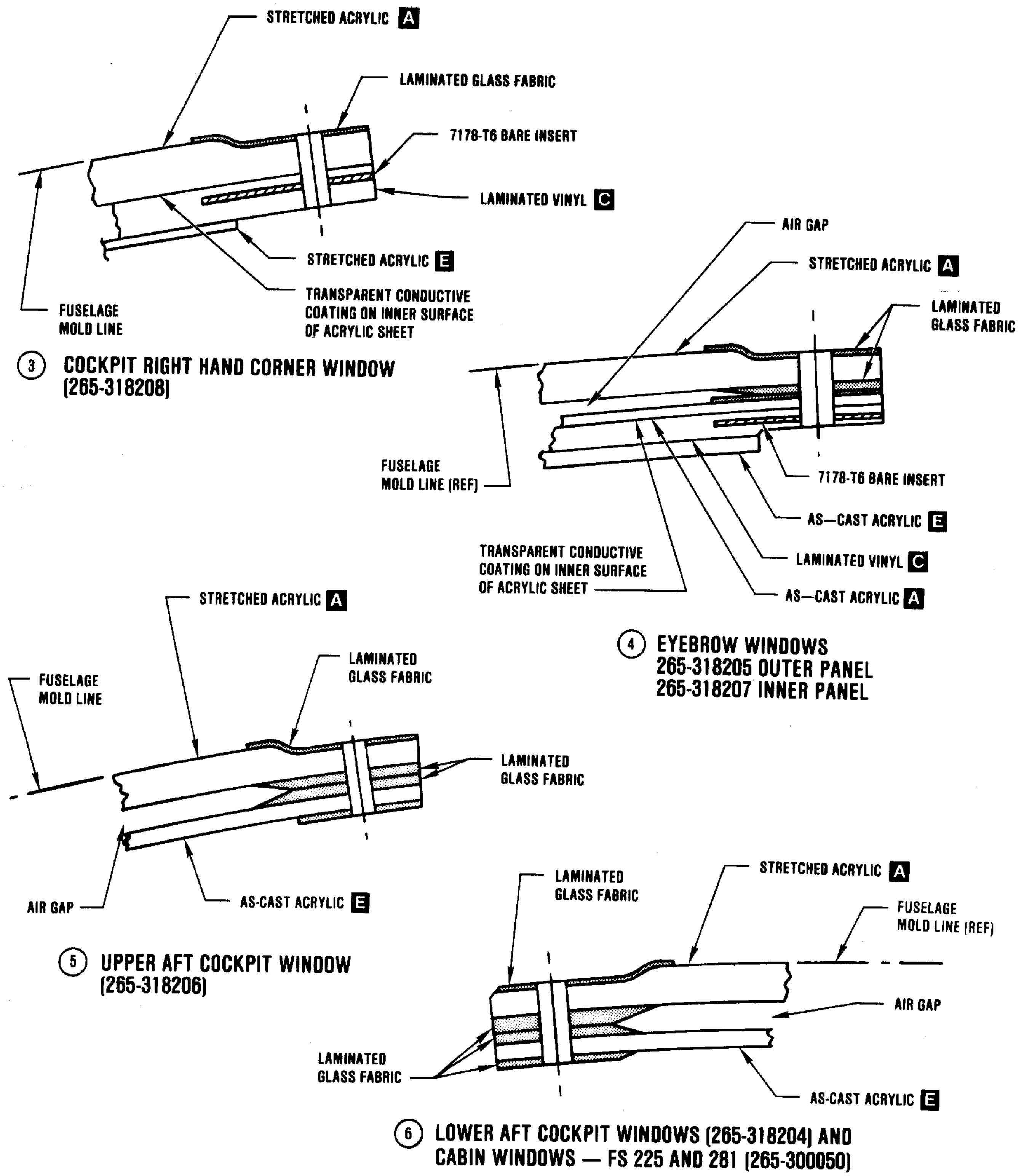


MODEL NA 265-40, -60, -60A, -60SC, AND -65

S265-3-218B

Figure 101 — Negligible Damage — Windshields and Windows (Sheet 1 of 5)

MAJOR CHANGE

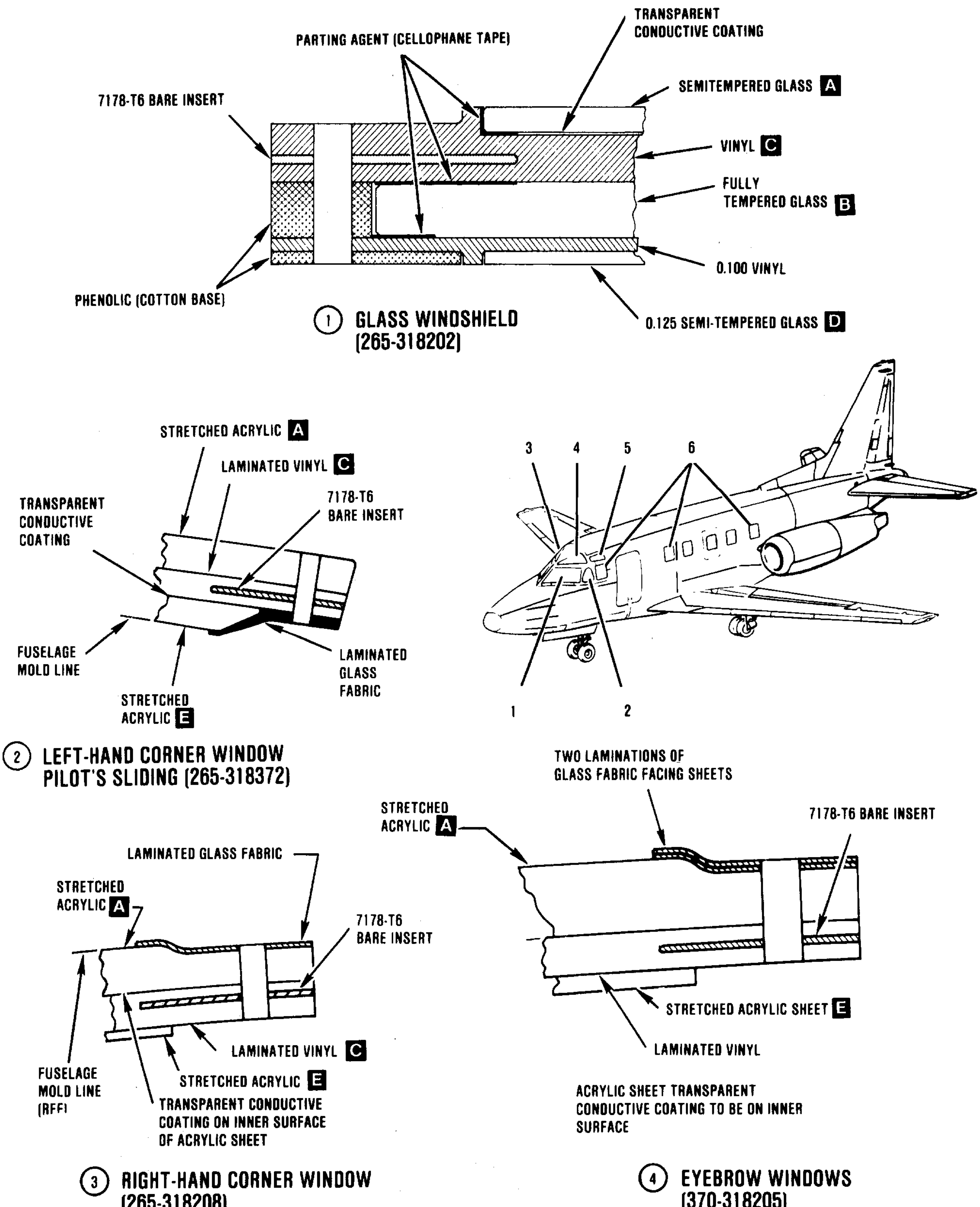


MODEL NA 265-40, -60, -60A, -60SC, AND -65

S265-3-219B

Figure 101 — Negligible Damage — Windshields and Windows (Sheet 2 of 5)

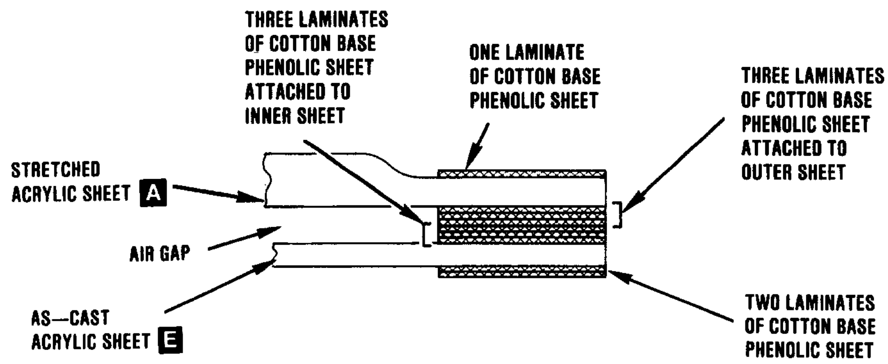
MAJOR CHANGE



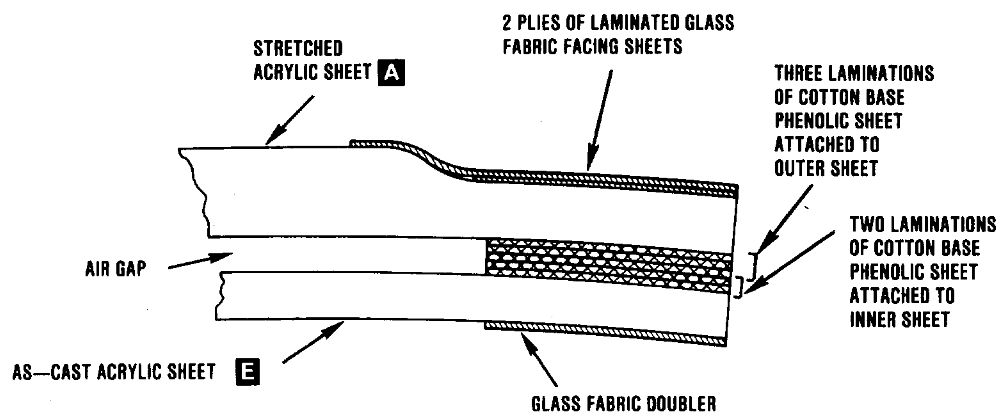
MODEL NA 265-70, -80, -80A, AND -80SC

S370-3-41

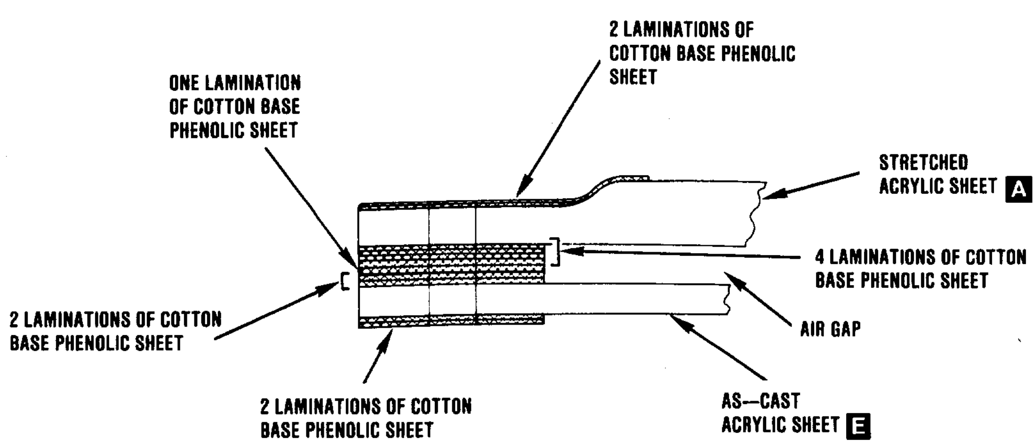
Figure 101 — Negligible Damage — Windshields and Windows (Sheet 3 of 5)



(5) UPPER AFT COCKPIT WINDOWS
(370-318206)



(6) LOWER AFT COCKPIT WINDOWS
(370-318204)



(6) CABIN WINDOWS
(370-300050)

MODEL NA 265-70, -80, -80A, AND -80SC

S370-3-42

Figure 101 — Negligible Damage — Windshields and Windows (Sheet 4 of 5)

CODE

[1] OUTER LAYER OF GLASS OR PLASTIC
[2] INTERMEDIATE LAYERS OF GLASS
[3] INTERMEDIATE LAYERS OF PLASTIC
[4] INNER LAYER OF GLASS
[5] INNER LAYERS OF PLASTIC

ITEM NO.	ASSEMBLY	CODE	ALLOWABLE DEFECTS					
			NICKS	SPALLS	SCRATCHES	CRACKS	BUBBLES	DELAMINATION
(1)	WINDSHIELD (PLASTIC)	[1]	YES	YES	YES	NO		YES [A]
		[3]					YES [B]	
		[5]	YES [C]	YES [C]	YES [C]	NO		
(1)	WINDSHIELD (GLASS)	[1]	YES	YES	YES	NO		YES [A]
		[2]	NO	NO	NO	NO		
		[3]					YES [B]	
		[4]	YES	YES	YES	YES [A]		YES [A]
(2)	LH CORNER WINDOW	[1]	YES	YES	YES	NO		YES [A]
		[3]					YES [B]	
		[5]	YES [C]	YES [C]	YES [C]	NO		
(3)	RH CORNER WINDOW	[1]	YES [C]	YES [C]	YES [C]	NO		NO
		[3]					YES [B]	
		[5]	YES	YES	YES	YES		YES
(4)	EYEBROW WINDOWS	[1]	YES [D]	YES [D]	YES [D]	NO		
	OUTER PANELS	[1]	YES [D]	YES [E]	YES [D]	NO		YES [F]
	INNER PANELS	[3]					YES [B]	
		[5]	YES [D]	YES [D]	YES [D]	NO		[H]
(5)	UPPER AFT COCKPIT WINDOWS	[1]	YES [E]	YES [E]	YES [E]	NO		
		[5]	YES [E]	YES [E]	YES [E]	NO		
(6)	LOWER AFT COCKPIT AND CABIN WINDOWS	[1]	YES [D]	YES [D]	YES [D]	NO		
		[5]	YES [E]	YES [E]	YES [E]	NO		

NOTES

- *Where spalls, scratches, and nicks are permitted, (and a footnote symbol is used), they must be smooth on the bottom with a minimum apex radius of 0.030 in. see footnotes for allowable depths on individual panels.*
- *Sharp-bottomed "V" scratches and nicks are not permitted in any panel where a footnote symbol is used. Such defects, which have a depth that does not exceed the allowable for that panel, may be polished out one time only in any area.*
- *No damage is anticipated on the layers that are not coded.*
- *Refer to "Windshields and Windows — General" (text) for definitions of nicks, scratches, spalls, delaminations, and cracks, and for additional information.*

[A] WHEN HEATING ABILITY IS LOST AND/OR WHEN OPTICAL DISTORTION CAUSES LOSS OF ESSENTIAL VISIBILITY, THE ASSEMBLY MUST BE REPLACED.

[B] SMALL BUBBLES ARE PERMISSIBLE. IF BUBBLES BECOME NUMEROUS ENOUGH OR GROW IN SIZE SO THAT THEY INTERFERE WITH VISIBILITY, THE ASSEMBLY MUST BE REPLACED.

[C] MUST NOT EXCEED A DEPTH OF 0.016 IN.

[D] MUST NOT EXCEED A DEPTH OF 0.010 IN.

[E] MUST NOT EXCEED A DEPTH OF 0.025 IN.

[F] LIMITED TO ONE INCH FROM THE EDGE OF THE CLEAR VISION AREA AROUND THE PERIPHERY OF THE PANEL.

[G] DELETED.

[H] LIMITED TO A DISTANCE OF 2 IN. FROM EDGE OF PANEL.

S265-3-220

Figure 101 — Negligible Damage — Windshields and Windows
(Sheet 5 of 5)

FLIGHT COMPARTMENT

STRUCTURAL IDENTIFICATION

GENERAL

Two types of windshields are used on the Model NA 265-40. On S/N 282-1 thru -35, plastic windshields, Part No. E-1117-1 and E-1117-2 are installed. On Model NA 265-40 S/N 282-36 and subs, glass windshields, Part No. 265-318202-13 and 265-318202-14 are installed. All other cockpit and cabin windows are laminated plastic construction. See figure 101, 56-00-10 for sectional views of windshield and window construction.

PLASTIC WINDSHIELDS, MODEL NA 265-40 (S/N 282-1 THRU -35)

Plastic windshields (E1117-1 and E-1117-2) are laminates composed of an outer face ply of hard abrasive-resistant plastic, 0.062 in. thick, a face ply interlayer of 0.025 in. polyvinyl, and an interply of 0.125 in. stretched acrylic. These three plies form the outer layer of the windshield. The main interlayer is 0.325 in. polyvinyl; the main inner structural ply is 0.750 in. stretched acrylic. The conductive coating for heating the windshield for anti-icing, defogging, and birdproofing is deposited on the inside surface of the 0.062 in. outer ply.

GLASS WINDSHIELDS, MODEL NA 265-40 (S/N 282-36 AND SUBS), -60, -60A, -60SC, -65, -70, -80, -80A, AND -80SC.

Glass windshields (265-318202) are composed of laminates consisting of an outer ply of 0.188 in. glass, an interlayer of laminated vinyl, a structural main ply of 0.375 in. glass, another interlayer of laminated vinyl, and an inner spall plate of 0.125 in. glass. The conductive coating for heating and birdproofing is deposited on the inner surface of the outer ply.

COCKPIT CORNER WINDOWS

The left corner window (265-318372) is a laminate consisting of an outer ply of 0.276 in. stretched acrylic, an interlayer of 0.275 in. laminated vinyl, and an inner ply of 0.350 in. stretched acrylic. The conductive coating for heating is deposited on the inner surface of the outer ply.

The right corner window (265-318208) is a laminate consisting of an outer ply of 0.390 in. stretched acrylic, an interlayer of 0.275 in. laminated vinyl, and an inner ply of 0.125 in. stretched acrylic. The conductive coating for heating is deposited on the inner surface of the outer ply.

COCKPIT EYEBROW WINDOWS, MODEL NA 265-40, -60, -60A, -60SC, AND -65

The eyebrow windows are composed of two panels seperated by an air gap 0.010 in. wide. The outer panel (265-318205-11 or 265-318205-12) is a monolithic sheet of 0.320 in stretched acrylic. The inner panel (265-318207-1 or 265-318207-2) is a laminate consisting of an outer ply of 0.080 in. as-cast acrylic, an interlayer of 0.200 in laminated vinyl, and an inner ply of 0.125 in. as-cast acrylic. The conductive coating for heating is deposited on the inner surface of the outer 0.080 in. as-cast acrylic ply.

COCKPIT EYEBROW WINDOWS, MODEL NA 265-70, -80, -80A, AND -80SC

The eyebrow windows (370-318205) are made up of a 0.275 in. thick panel of laminated vinyl sandwiched between inner and outer panels of stretched acrylic. The outer panel is 0.500 in. thick and the outer panel is 0.125 in. thick. The conductive coating for heating is applied to the inner surface of the outer stretched acrylic sheet.

AFT COCKPIT WINDOWS

The aft cockpit windows consist of two monolithic structural panels, an outer of stretched acrylic and an inner of as-cast acrylic. Several layers of laminated glass fabric are bonded to the edges of inner surface of outer panel and outer surface of inner panel. The laminates on these edges serve to space the two panels apart and provide an air gap between them. The aft upper (265-318206) have a 0.276 in. thick outer ply and a 0.125 in. inner ply. The aft lower windows (265-318204) have outer plies 0.320 in. thick and inner plies 0.150 thick.

FLIGHT COMPARTMENT

ALLOWABLE DAMAGE

GENERAL

Negligible damage limits for windshields and cockpit windows are given in this section and in section 56-00-10.

NEGLIGIBLE DAMAGE LIMITS

Nicks are defined as broken indentations or cavities having sharp edges. Spalls are cavities left by the loss of a fragment having at least one feathered edge. Scratches are tears in the surface made by a hard object. They are shallow marks, grooves, furrows, or channels. Cracks are fractures which extend partially or completely through a given member. Delamination is the separation of two layers of a laminated multilayer panel.

WINDSHIELDS

1. Plastic Windshields

   Spalls, scratches, or nicks are permitted in the outer ply. Cracks usually cause loss of heating capability and are cause for replacement. Delamination of outer ply is permitted.

   Cracks are not permitted in the main structural inner ply. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.015 in. Sharp-bottomed ("V") scratches and nicks are not permitted. Such defects that have a depth that does not exceed 0.016 in. may be polished out one time only in any area.

2. Glass Windshields

   Spalls, scratches, or nicks are permitted in the outer ply. Cracks usually cause loss of heating capability and are cause for replacement. Delamination of outer ply is permitted.

   Cracks, spalls, or nicks are not allowed in the main structural ply. This is an internal member, and both surfaces are protected by other plies of the windshield.

   Cracks, scratches, spalls, or nicks are acceptable in the spall plate (the inner ply of glass windshield). Delamination of the inner ply from the vinyl interlayer is permitted.

CORNER WINDOWS

1. Left Corner Window

   Spalls, scratches, and nicks are permitted in outer ply. Cracks are not permitted in this ply. Defects on this surface that interfere with visibility may be polished out. Delamination is permissable up to 30 percent of the window area.

   Cracks are not permitted in the main structural inner ply. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.016 in. Sharp-bottomed ("V") scratches and nicks are not permitted. Such defects that have a depth that does not exceed 0.016 in. may be polished out one time only in any area.

2. Right Corner Windows

   The outer ply is the main structural ply; cracks are not permitted. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.016 in. Sharp-bottomed ("V") scratches annd nicks are not permitted. Such defects that have a depth that does not exceed 0.016 in. may be polished out one time only in any area. Delamination of the outer ply from the vinyl interlayer is not permitted.

   Spalls, scratches, nicks, and cracks in the inner ply are permissable. Delamination of the inner ply is permissable.

EYEBROW WINDOWS, MODEL NA 265-40, -60, -60A, -60SC, AND -65

1. Outer Panel

   This is the main structural ply; cracks are not permitted. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.010 in. Sharp-bottomed ("V") scratches and nicks are not permitted. Such defects that are not deeper than 0.010 in. may be polished out one time only in any area. Delamination of the glass fabric laminations is not cause for replacement of a panel.

2. Inner Panel, Outer Ply

   No cracks are permitted in the outer ply (0.080 in.) of this panel. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.025 in. Sharp-bottomed ("V") scratches and nicks are not permitted. Such defects that are not deeper than 0.025 in. may be polished out one time only in any area. Delamination of the outer ply from the vinyl interlayer is perrmissable around the edges of the panel. This delamination is limited to one in. from the edge of the clear-vision area around the periphery of the panel.

3. Inner Panel

   Cracks are not permitted in the inner ply. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.004 in. Sharp-bottomed ("V") scratches are not permitted. Such defects that are not deeper than 0.004 in. may be polished out one time only in any area. Delamination of the inner ply from the laminated vinyl innerlayer is permissable for a distance of 2 in. from the edge of the ply.

ALLOWABLE DAMAGE (Continued)

EYEBROW WINDOWS, MODEL NA 265-70, -80, -80A, AND -80SC

Inner and Outer Panels

Cracks are not permitted in either the outer panel (main structural ply) or the inner ply. (Refer to 56-00-10). Spalls and smooth-bottomed nicks or scratches are acceptable, provided the defects do not exceed 0.010 in. in depth in the outer panel. Sharp-bottomed ("V") type scratches are not acceptable; such defects which do not exceed 0.010 in. in the outer panel or 0.004 in. in the inner ply, may be polished out one time only in any area. Delamination of the glass fabric laminations from the stretched acrylic outer panel is acceptable and is not cause for replacement of the window. Delamination of the stretched vinyl inner ply from the laminated vinyl inner layer is acceptable for a distance of two in. from the edge of the ply.

AFT COCKPIT WINDOWS

The structural plies of these panels are monolithic and therefore will not delaminate. Delamination of the glass fabric edge spacers is not reason for replacement. Cracks are not allowed in any of these panels. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.025 in. Sharp-bottomed ("V") scratches and nicks are not permitted. Such defects that are not deeper than 0.025 in. may be polished out one-time only in any area.

WINDSHIELD DAMAGE LIMITS FOR ONE-TIME FLIGHT

The maximum damage condition of a windshield panel permitted for a one-time flight to a repair facility is as follows: The outer ply may be cracked completely across the panel if (1) the ply cracks clean, leaving a smooth outer surface, and (2) there is no delamination from the vinyl interlayer along the edges of the crack.

With the windshield damage condition described in the preceding paragraph, cabin pressure may be maintained. The windshield heating capability, however, is lost because of a discontinuity of the conductive coating between the outer and intermediate windshield plies. Full birdproof capability of the windshield plies. Full birdproof capability of the windshield is dependent on heating of the interlayers. With windshield heating inoperative, it therefore follows that the windshield will have reduced capability of withstanding bird impact.

Because of reduced birdproof capability and a tendency of the windshield to deflect outward from cabin pressurization at high altitude, it is recommended that the flight be restricted to the following conditions.

1. Do not use windshield heat.
2. Maximum airspeed is 200 KIAS.
3. Maintain altitude of 6000 feet above local ground level.
4. Maintain the minimum altitude above condition 3 permitted by weather and other flight conditions.
5. A placard clearly stating the foregoing flight restrictions must be conspicously posted in the cockpit.

AFT COCKPIT AND CABIN WINDOWS DAMAGE LIMITS FOR ONE-TIME FLIGHT

The maximum damage limits of aft cockpit and cabin windows for one-time flight to repair facility is as follows:

1. The outer ply or inner ply may have a crack extending across the panel provided the ply cracks clean, leaving a smooth outer surface.
2. Spalls, smooth-bottomed scratches, and nicks, which exceed repairable limits (0.025 in.).
3. Sharp-bottomed ("V") scratches and nicks, which exceed repairable limits.

CAUTION

Numerous cracks, which radiate outward from a central point will not be allowed and must be changed before further flight.

With window damage described in preceeding paragraph, cabin pressurization will not be used for entire duration of flight. It is recommended that the flight be restricted to the following conditions.

1. Maximum airspeed at 200 KIAS.
2. Maximum altitude for flight, 10,000 feet, M.S.L.
3. A placcard clearly stating the foregoing flight restrictions must be conspicuously displayed in the cockpit.
4. Minimum flight crew.

FLIGHT COMPARTMENT

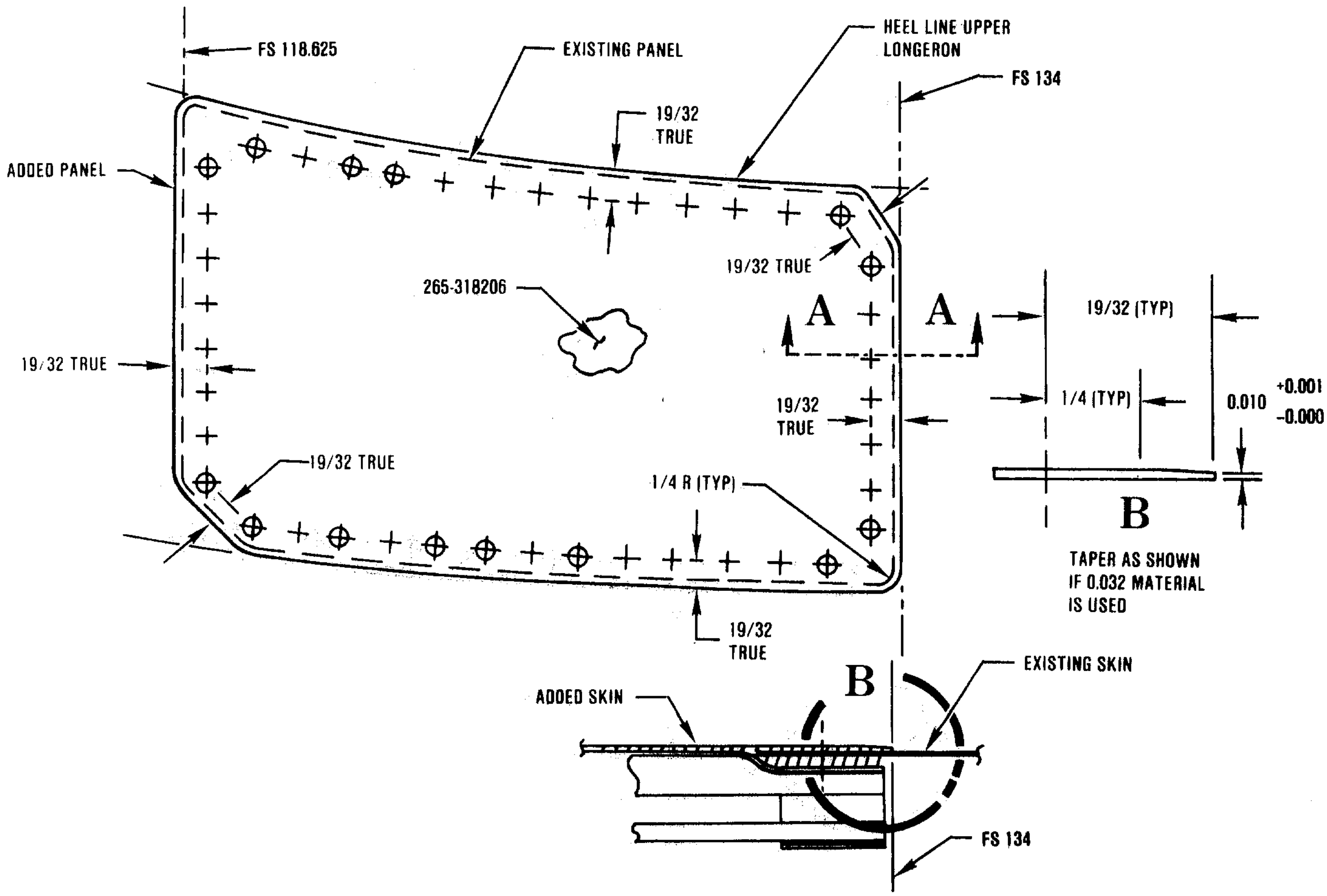
REPAIR

GENERAL

This section contains repairs for the flight compartment windows.

COCKPIT ENCLOSURE, UPPER AFT ACRYLIC PANEL REPAIR

See figure 201.



SECTION A-A

1 Remove fasteners around periphery of damaged panel.

2 Prepare surface for application of sealant. Refer to 51-20-10.

3 Add 0.020 stainless steel 1/2 hard panel to cover entire area of existing panel. Dimple holes to match. Form to contour. (Alternate material 0.032 2024-T3, countersink to match. Prime and paint.)

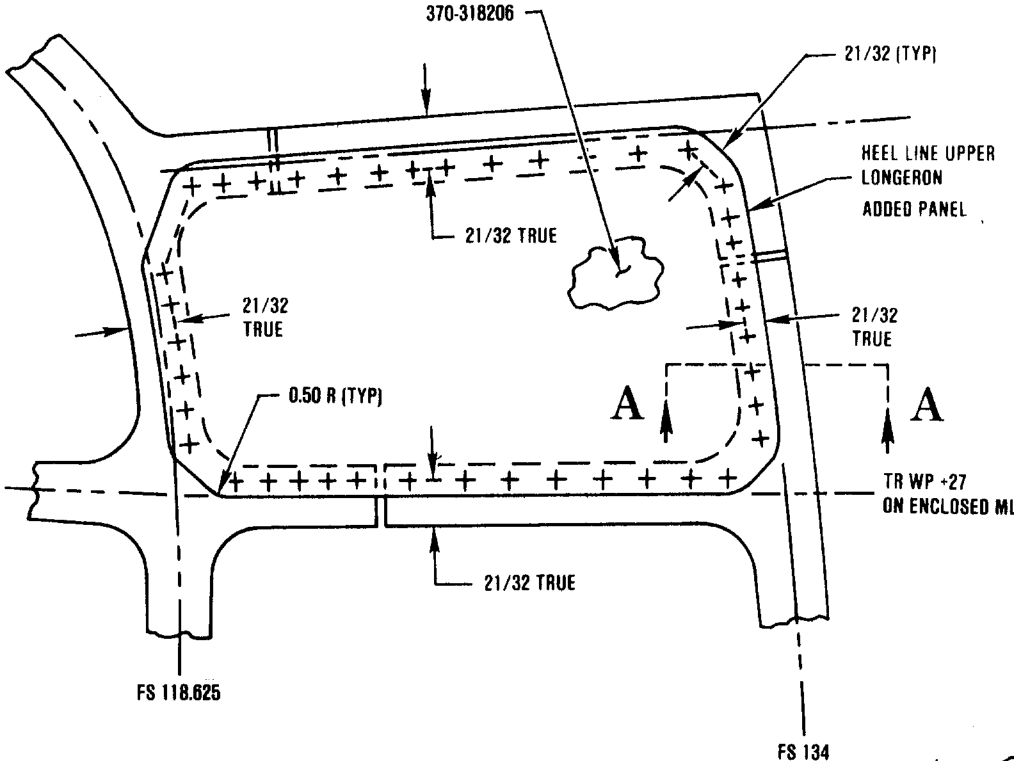
4 Coat screws with sealant when new skin is assembled. Refer to 51-20-10.

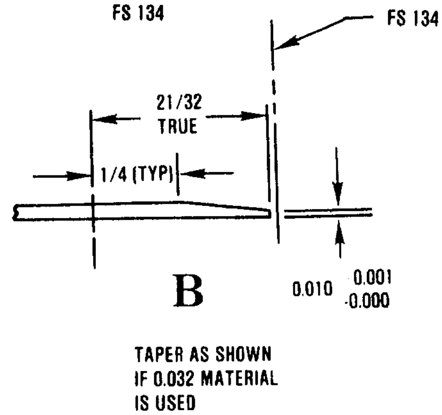
5 Finish per Finish Spec 246-00024.

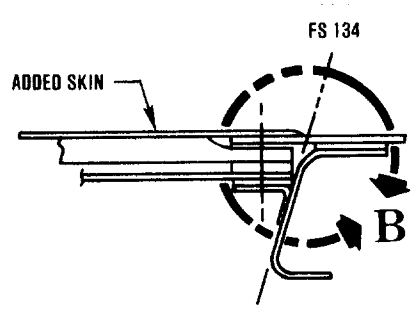
NOTE

THIS REPAIR IS APPLICABLE TO DAMAGED LH AND RH UPPER AFT ACRYLIC PANELS ON MODEL NA 265-40, -60, -60A, AND -60SC.

Cockpit Enclosure, Upper Aft Acrylic Panel, Repair
Figure 201 (Sheet 1 of 2)







SECTION A-A

1 Remove fasteners around periphery of damaged panel.

2 Prepare surface for application of sealant. Refer to 51-20-10.

3 Add 0.020 stainless steel 1/2 hard panel to cover entire area of existing panel. Dimple holes to match. Form to contour. (Alternate material 0.032 2034-T3, countersink to match. Prime and paint.)

4 Coat screws with sealant when new skin is assembled. Refer to 51-20-10.

5 Finish per Finish Spec 246-00024.

NOTE

THIS REPAIR IS APPLICABLE TO DAMAGED LH AND RH UPPER AFT ACRYLIC PANELS ON MODEL NA 265-80, -80A, AND -80SC.

Cockpit Enclosure, Upper Aft Acrylic Panel, Repair
Figure 201 (Sheet 2 of 2)

CABIN WINDOWS

STRUCTURAL IDENTIFICATION

GENERAL

Each cabin window is composed of two seperate monolithic structural panels, an outer one of stretched acrylic and an inner one of as-cast acrylic. Several layers of laminated glass fabric are bonded to the edges of the inner surface of the outer panel and the outer surface of inner panel. The laminates on these edges serve to space the two outer panels apart and provide an air gap between them. The cabin windows (265-300050) have outer plies 0.320 in. thick and inner plies of 0.150 in. thick.

CABIN WINDOWS

ALLOWABLE DAMAGE

GENERAL

Negligible damage limits for the cabin windows are given in this section and section 56-00-10.

NEGLIGIBLE DAMAGE LIMITS

The structural plies of these panels are monolithic and therefore will not delaminate. Delamination of the glass fabric edge spacers is not reason for replacement. Cracks are not allowed in any of these panels. Spalls and smooth-bottomed scratches and nicks are permitted if they do not exceed a depth of 0.002 in. Sharp-bottomed ("V") scratches and nicks are not permitted. Such defects that are not deeper than 0.002 in. may be polished out one time only in any area.

CHAPTER 57

WINGS

CHAPTER 57

WINGS

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CHAPTER 57

WINGS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Continued)

CHAPTER 57

WINGS

LIST OF EFFECTIVE PAGES

* The asterisk indicates pages revised, added, or deleted by the current revision.

LIST OF EFFECTIVE PAGES

Chapter/ Section		Page	Date
57-50-00		1	Aug 17/84
		2	Aug 17/84
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		4	Aug 17/84
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		7	Aug 17/84
		8	Aug 17/84
		9	Aug 17/84
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		214 *	Mar 16/90
	Added	214A/214B *	Mar 16/90
		215	Aug 17/84
		216	Aug 17/84
		217	Aug 17/84
		218	Aug 17/84
		219/220	Aug 17/84

* The asterisk indicates pages revised, added or deleted by the current revision.

CHAPTER 57

WING

STRUCTURAL IDENTIFICATION

GENERAL

On model NA 265-40, -60, -70, and -80, the fixed structure consists of the structural box section, leading edge, trailing edge, and wing tips. The slats, ailerons, and flaps comprise the flight surfaces. The wing is a fully cantilevered, tapered airfoil section with 0° incident at the root and a -2.5° incident at the tip. Sweepback is approximately 28.5°, measured at the 25% chord plane, and wing dihedral is 3° 8.5 minutes. The main box section and inbd leading edge are sealed and function as a fuel tank with a capacity of about 446 gallons in each wing panel.

On model NA 265-60A, -60SC, -65, -80A, and -80SC, the fixed structure consists of the structural box section, leading edge, trailing edge, extended wing tip panels, and wing tips. The flight surfaces include the ailerons, fowler-type flaps, and the spoilers. The wing is a fully cantilevered, tapered airfoil section with 1.68° incident at the root and -4.64° incident at wing tip. Sweepback at the wing leading edge is 32.79° and the dihedral is 3.14°. The wing and leading edge are sealed and function as a fuel tank with a capacity of 544 gal. in each wing panel.

On all airplanes, the two wing panels are closed out by a common centerline rib with splice plates on the upper surfaces. The wings are mated to the fuselage with four bolts. On model NA 265-40, -60, -60A, -60SC, and -65 the wing-to-fuselage attach points are at FS 206 and 264.25. On model NA 265-70, -80, -80A, and -80SC, the wing-to-fuselage attach points are at FS 206±17 and 264.25. The main landing gear, is attached to the rear spar at the canted wing station (CWS) 59.095. Airplane jacking pads can be attached to fittings adjacent to the front spar at WS 94.187. A cast aluminum skid is provided under the wing panel mating joint to preclude structural damage in event of a gear-up landing.

Wing panels are part-numbered and serial-numbered in mated pairs only. The identification plate is on the centerline of the rear spar web.

BOX SECTION

The backbone of the wing is a main box beam extending from wing tip to wing tip. The box is formed by a front and rear spar, transverse ribs, and upper and lower main skins, which extend from the front to the rear spar. The skins are stiffened spanwise by integrally machined stringers. Chordwise stiffening is achieved by sheet metal formers. Fueltight sealing is accomplished by the integral groove injection method along fastener rows. Individual fastener holes are counterbored, and the fasteners are sealed with 0-rings.

On model NA 265-60A, -60SC, -65, -80A, and -80SC, a 30 in. wing tip extension has been added to each wing box section outbd of the fueled area. An overwing fuel tank has also been added aft of the front spar, between WS 40.812 and 138.264.

CAUTION

Repairs or modifications involving the use of steel or other magnetic materials (including fasteners) are prohibited within a 36 in. radius of the compass system flux gates in each wing tip. Non-magnetic materials are the only acceptable materials that may be added in these areas.

LEADING EDGE — MODEL NA 265-40, -60, -70, AND -80

The leading edge is made up of an inbd, an intermediate (underslat), and an outbd section. All sections are of basically the same construction: A chem-milled skin wrapped around the nose lines from the upper front spar cap to the lower main box skin. Attachment to the lower skin is just fwd of the lower front spar cap.

The inbd section is sealed and serves as a portion of the wing fuel tank. The intermediate, or underslat, leading edge is recessed to accommodate the slats and house the slat track assemblies. Slat track ribs are removable. A series of covers along the lower leading edge surface provides access to slat track assemblies. The outbd section continues the wing leading edge lines from the outer end of the slat to the wing tip fairing.

LEADING EDGE — MODEL NA 265-60A, -60SC, -65, -80A, -80SC

The wing leading edges on model NA 265-60A, -60SC, -65, -80A, and -80SC have been modified to carry fuel. The extreme fwd portion of the leading edges are isolated from the fuel area by the leading edge spar. A graduated dia. anti-icing duct is installed on the fwd side of the leading edge spar. Holes drilled in the anti-icing duct direct heated engine bleed air against the leading edge fwd skins to provide anti-icing protection. The fueled area of the leading edge is protected from the heat of the anti-icing duct by insulation, installed on the fwd face of the leading

STRUCTURAL IDENTIFICATION (Continued)

LEADING EDGE — MODEL NA 265-60A, -60SC, -65, -80A, -80SC (Cont'd)

edge spar. The leading edge is fabricated from formed sheet metal ribs, stringers, and skins, which are secured in place by sealed fasteners. A series of large sealed access doors is located on the lower surface of the leading edge to provide access to the interior of the leading edge.

TRAILING EDGE — MODEL NA 265-40, -60, -70, AND -80

The trailing edge is divided into three sections: The inbd, intermediate, and outbd trailing edge assemblies. All are cantilevered from the rear spar. The inbd trailing edge assembly consists of front and rear beams, transverse ribs, and upper and lower skins. The rear beam is made up of a sheet metal channel and a honeycomb sandwich panel trailing edge. A heavy honeycomb sandwich panel bridges the landing gear strut well and connects the trailing edge assembly to the rear spar.

The intermediate trailing edge assembly attaches to the rear spar and consists of ribs, narrow upper and lower skins, and a honeycomb sandwich panel trailing edge over the flap. An aerodynamic flap seal is attached to the lower side of the assembly. The outbd trailing edge assembly attaches to the rear spar and consists of three ribs, a rear beam, upper and lower skins, and a honeycomb panel trailing edge.

TRAILING EDGE — MODEL NA 265-60A, -60SC, -65, -80A, AND -80SC

On model NA 265-60A, -60SC, -65, -80A, and -80SC the trailing edge consists of formed sheet metal ribs attached to the rear spar, upper and lower skins, and a honeycomb sandwich panel attached to the aft end of the ribs. The honeycomb panel completely covers the flaps when they are in the retracted position. The spoilers are installed in the trailing edge structure fwd of the honeycomb panel. The trailing edge extends from the fuselage mold line to the outbd end of the flaps (approximately WS 161.122).

SLATS — MODEL NA 265-40, -60, -70, and -80

A set of five slats is provided over the intermediate wing leading edge assembly. Each slat is cantilevered from leading edge ribs by two track and roller assemblies. The five slats are interconnected and operate as a single aerodynamic unit.

Slat construction consists of ribs, a sheet metal beam, a honeycomb sandwich trailing edge, and upper and lower skins.

AILERONS

The aileron is a single-cell torque box consisting primarily of a sheet-metal beam, transverse ribs, upper and lower skins, and a honeycomb sandwich panel trailing edge. A trim tab of honeycomb sandwich construction is provided on the left aileron.

The aileron is mounted to the wing rear spar by two hinges. Aerodynamic balance is obtained by a series of steel weights attached inside the leading edge skin.

FLAPS — MODEL NA 265-40, -60, -70, AND -80

The flap is a two-celled torque box consisting primarily of a spar, a rear beam, and a transverse rib enclosed in upper, lower, and leading edge skins. The rear beam incorporates a sheet-metal channel and honeycomb sandwich trailing edge. The flap operates on two tracks cantilevered from the wing rear spar.

FLAPS — MODEL NA 265-60A, -60SC, -65, -80A, AND -80SC

On model NA 265-60A, -60SC, -65, -80A, and -80SC the flap is a single-cell torque box consisting of a leading edge skin, upper and lower machined stringers, upper and lower skins, transverse ribs, rear beam, and a trailing edge. Flap movement is controlled by two electrically operated screwjacks mounted adjacent to the two flap tracks at WS 72 and 132.

SPOILERS — MODEL NA 265-60A, -60SC, -65, -80A, AND -80SC

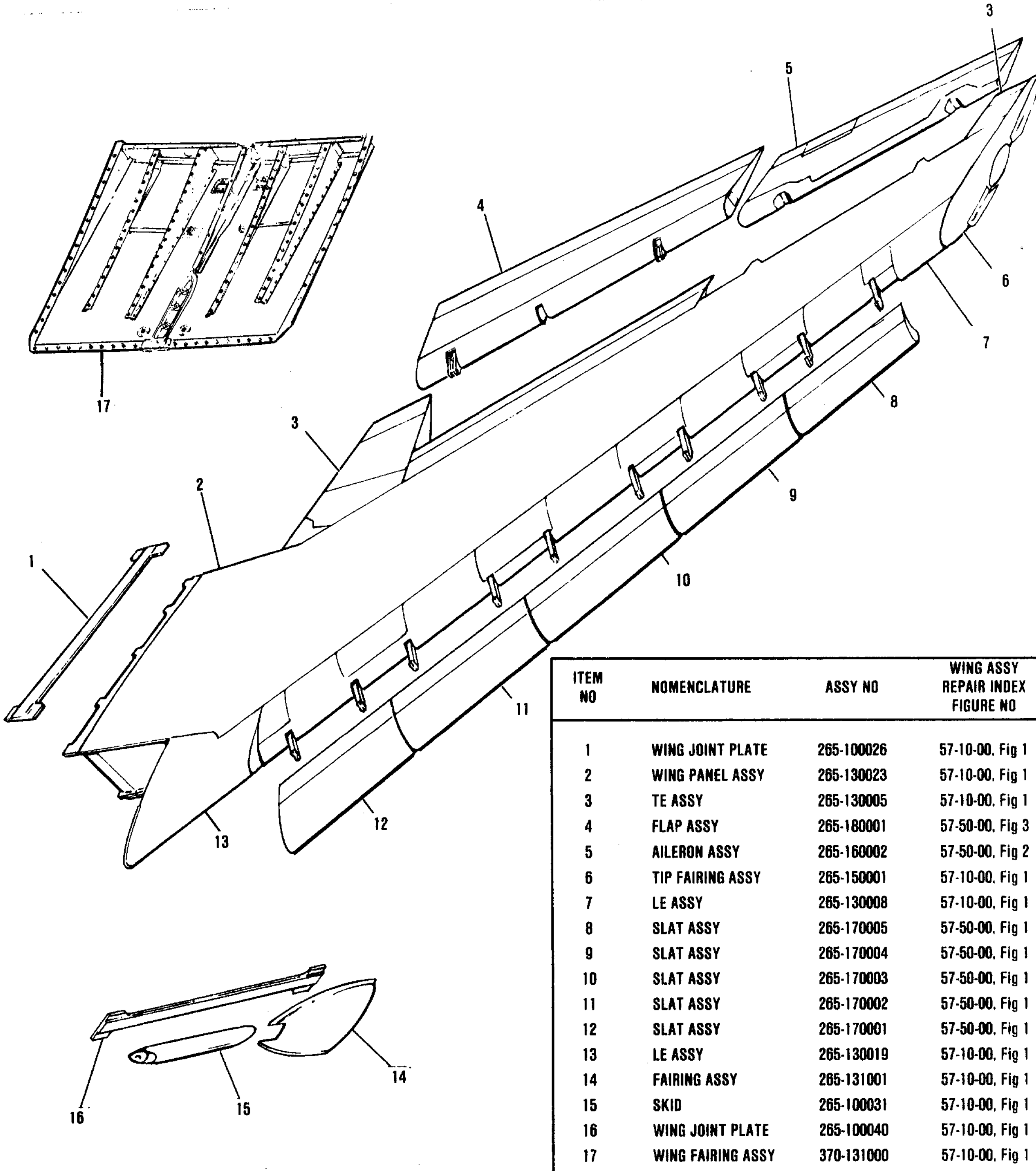
The spoiler system is installed on the upper surface of the wing, as the primary means of increasing the rate of descent (decreasing airspeed) from cruise altitude for conditions such as emergency descent. The 4 spoiler panel systems are electrically controlled and hydraulically actuated to a 43° ±3° position. The electrical control system provides for either manual or automatic operation of the spoilers. The automatic mode is used to extend the spoilers on touchdown to shorten the landing distance.

WING MASTER REPAIR INDEX

See figure 1 for model NA 265-40, -60, -70, and -80. See figure 2 for model NA 256-60A, -60SC, -65, -80A, and -80SC.

WING COMPONENT SKIN GAP DIAGRAM

See figure 3.



ITEM NO	NOMENCLATURE	ASSY NO	WING ASSY REPAIR INDEX FIGURE NO
1	WING JOINT PLATE	265-100026	57-10-00, Fig 1
2	WING PANEL ASSY	265-130023	57-10-00, Fig 1
3	TE ASSY	265-130005	57-10-00, Fig 1
4	FLAP ASSY	265-180001	57-50-00, Fig 3
5	AILERON ASSY	265-160002	57-50-00, Fig 2
6	TIP FAIRING ASSY	265-150001	57-10-00, Fig 1
7	LE ASSY	265-130008	57-10-00, Fig 1
8	SLAT ASSY	265-170005	57-50-00, Fig 1
9	SLAT ASSY	265-170004	57-50-00, Fig 1
10	SLAT ASSY	265-170003	57-50-00, Fig 1
11	SLAT ASSY	265-170002	57-50-00, Fig 1
12	SLAT ASSY	265-170001	57-50-00, Fig 1
13	LE ASSY	265-130019	57-10-00, Fig 1
14	FAIRING ASSY	265-131001	57-10-00, Fig 1
15	SKID	265-100031	57-10-00, Fig 1
16	WING JOINT PLATE	265-100040	57-10-00, Fig 1
17	WING FAIRING ASSY	370-131000	57-10-00, Fig 1

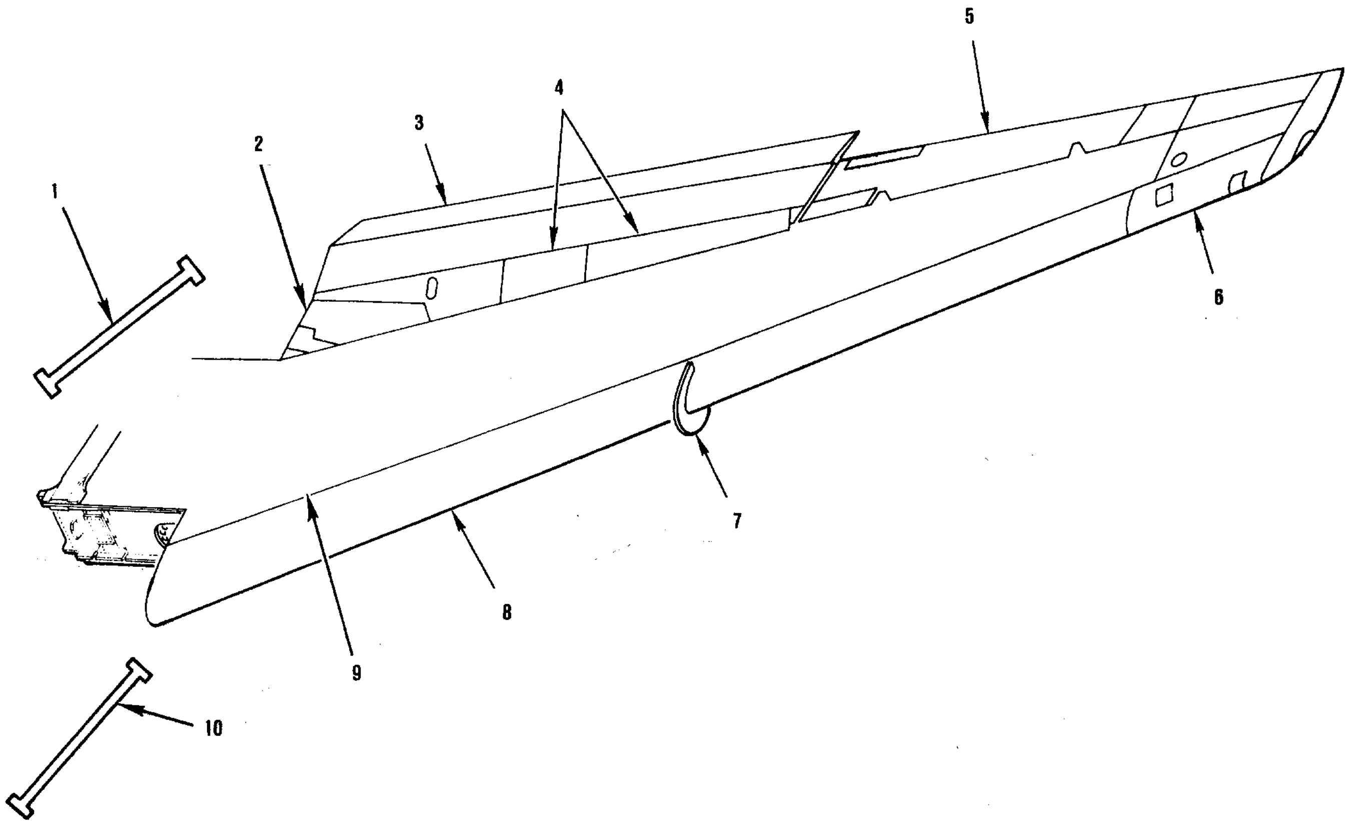
SEE SECTION 57-00-10 FOR NEGLIGIBLE DAMAGE LIMITATIONS.

NOTE

WING ASSEMBLY IDENTIFICATION PLATES ARE ON THE CENTERLINE OF THE REAR SPAR WEB.

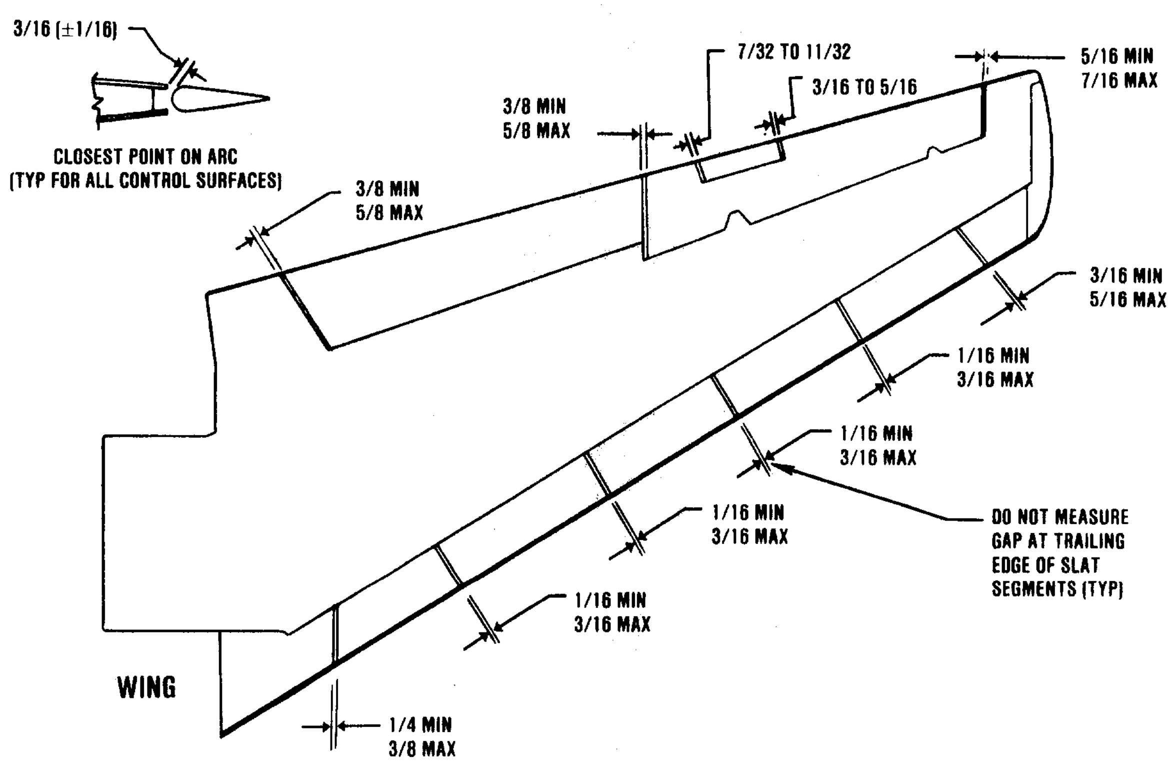
S265-3-221A

Wing Master Repair Index — Model NA 265-40, -60, -70 and -80
Figure 1



ITEM NO	NOMELCLATURE	ASSY NO
1	WING JOINT PLATE, UPPER	265-100026
2	TE ASSY	76-57304
3	FLAP	76-57630
4	SPOILER	76-57375
5	AILERON	265-100001
6	WING TIP	76-57238
7	FENCE	76-57496
8	LE ASSY	76-57401
9	WING PANEL ASSY	265-100002
10	WING JOINT PLATE, LOWER	265-100040

Wing Master Repair Index —
Model NA 265-60A, -60SC, -65, -80A, and -80SC
Figure 2



NOTES

- SKIN GAP TOLERANCES NOT SPECIFICALLY SHOWN ARE 0 TO 1/16 IN.
- SKIN GAP TOLERANCES GIVEN ON THIS ILLUSTRATION ARE FOR FITTING OF NEW PARTS.

S265-3-222

Wing Component Skin Gap Diagram — Model NA 265-40, -60, -70, and 80
Figure 3

WING

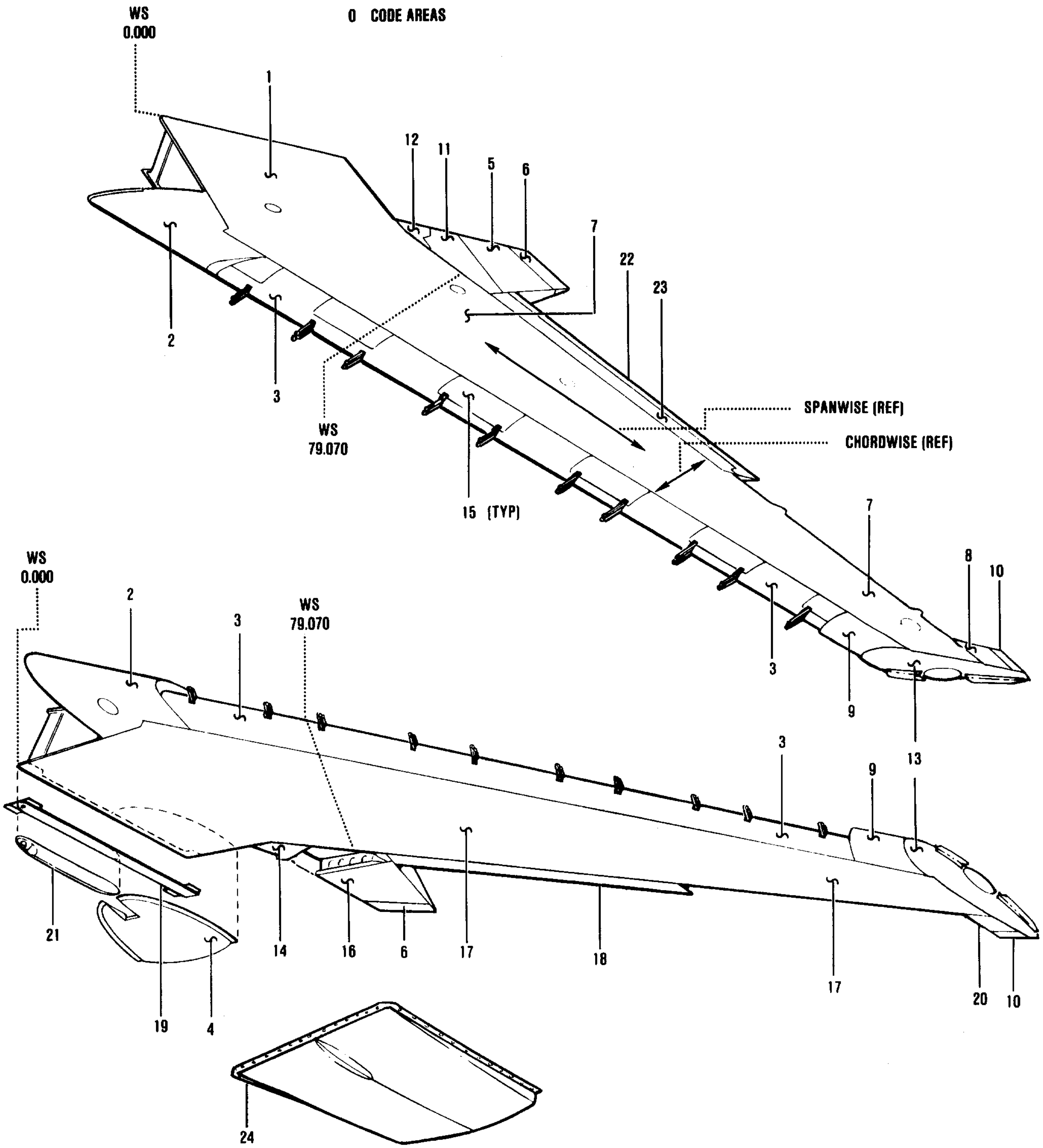
ALLOWABLE DAMAGE

GENERAL

This section contains negligible damage limits for the wing. See Figure 101.

OVERWING FAIRING DELAMINATION LIMITS — MODEL NA 265-60A, -60SC, -65, -80A and -80SC.

If there is any edge delamination or approximately 36 to 40 inches square total delamination, the overwing fairing is in need of repair before the next flight. Contact Sabreliner Corporation for repair (314) 537-3660.



NOTE

DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.

S265-3-223A

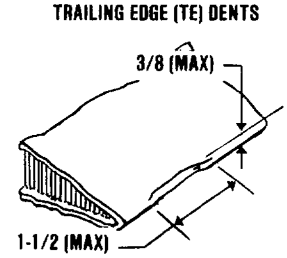
Negligible Damage — Wing —
Model NA 265-40, -60, -70, and -80
Figure 101 (Sheet 1 of 5)

HONEYCOMB NEGLIGIBLE DAMAGE

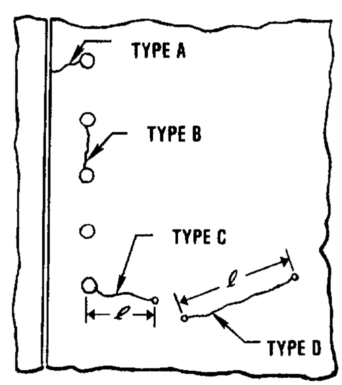
CODE AREA	SCRATCHES				DENTS			HOLES	
	CHORDWISE		SPANWISE		DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS	DIA IN IN.	UNDAMAGED MATERIAL BETWEEN HOLES
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.					
6	0.002 0.004	UNLIMITED 2	0.002 0.004	UNLIMITED 10	1 2 3 (MAX)	0.030 0.050 0.070	3 4 5	1 (MAX)	5
10	0.002 0.004	UNLIMITED 2	0.002 0.004	UNLIMITED 10	1 2 3	0.030 0.050 0.070	3 4 5	1 (MAX)	5
11	0.003 0.006	5 3	0.003 0.006	10 6	1 2 3 (MAX)	0.030 0.050 0.075	5 4 4	1/4 (MAX)	5
22	0.002 0.004	3 2	0.002 0.004	UNLIMITED 8	1 2 3	0.030 0.050 0.070	3 4 5	1 (MAX)	5

CRACKS				
CODE AREA	TYPE A	TYPE B	TYPE C	TYPE D
1	NONE	NONE	NONE	NONE
2	NONE	NONE	NONE	NONE
3	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	ℓ = 1 IN.	ℓ = 1 IN.
4	1 MAX EA SIDE OF CL	1 MAX EA SIDE OF CL	ℓ = 1 IN.	ℓ = 2 IN.
5	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	ℓ = 1 IN.	ℓ = 1 IN.
6	HONEYCOMB	HONEYCOMB	HONEYCOMB	HONEYCOMB
7	NONE	NONE	NONE	NONE
8	2 PERMITTED IN ANY ONE ROW OF RIVETS	2 PERMITTED IN ANY ONE ROW OF RIVETS	ℓ = 1 IN.	ℓ = 1-1/2 IN.
9	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	ℓ = 3/4 IN. 1 WITH 5 GOOD RIVETS EA SIDE	ℓ = 1 IN.
10	HONEYCOMB	HONEYCOMB	HONEYCOMB	HONEYCOMB
11	HONEYCOMB	HONEYCOMB	HONEYCOMB	HONEYCOMB
12	NONE	NONE	NONE	ℓ = 1 IN. A
13	2 PERMITTED IN ANY ONE ROW OF FASTENERS	2 PERMITTED IN ANY ONE ROW OF FASTENERS	ℓ = 1 IN.	ℓ = 1 IN.
14	NONE	NONE	NONE	NONE
15	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	NONE	ℓ = 1 IN.
16	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	NONE	NONE
17	NONE	NONE	NONE	NONE
18	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	ℓ = 1 IN.	ℓ = 1 IN.
19	NONE	NONE	NONE	NONE
20	2 PERMITTED IN ANY ONE ROW OF RIVETS	2 PERMITTED IN ANY ONE ROW OF RIVETS	ℓ = 1 IN.	ℓ = 1-1/2 IN.
21	SKID	SKID	SKID	SKID
22	HONEYCOMB	HONEYCOMB	HONEYCOMB	HONEYCOMB
23	1 WITH 5 GOOD HOLES EA SIDE OF DAMAGE	1 PERMITTED IN ANY ONE BAY	ℓ = 1 IN.	ℓ = 1 IN.

TRAILING EDGE (TE) DENTS



TE DENTS MAY BE REMOVED (OR PARTIALLY REMOVED) BY A CLAMPING PRESSURE. DO NOT HAMMER ON BONDED HONEYCOMB.



NOTES

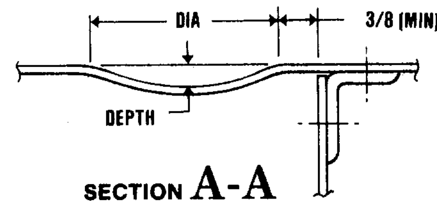
- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED in 51-70-70.

A 1 ONLY PER PANEL

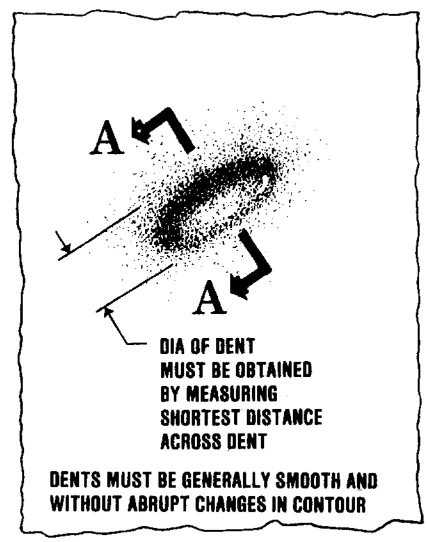
S265-3-224

Negligible Damage — Wing —
Model NA 265-40, -60, -70, and -80
Figure 101 (Sheet 2 of 5)

DENTS	
DIA IN IN.	DEPTH IN IN. (MAX)
1	1/64
2	3/64
3	1/16
4	5/64
5	7/64
6	1/8
7	9/64
8 AND LARGER	5/32



CODE AREA	SCRATCHES			
	CHORDWISE		SPANWISE	
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.
1	0.006	4	0.006	6
2	0.006	6	0.006	10
3	20% SKIN THICKNESS	3 (ONE MAX IN EA BAY)	20% SKIN THICKNESS	5 (ONE MAX IN EA BAY)
4	25% SKIN THICKNESS	UNLIMITED	25% SKIN THICKNESS	UNLIMITED
5	25% SKIN THICKNESS	4	25% SKIN SHICKNESS	6
6	HONEYCOMB		HONEYCOMB	
7	15% SKIN THICKNESS	4	15% SKIN THICKNESS	6
8	25% SKIN THICKNESS	5	25% SKIN THICKNESS	6
9	25% SKIN THICKNESS	5	25% SKIN THICKNESS	6
10	HONEYCOMB		HONEYCOMB	
11	HONEYCOMB		HONEYCOMB	
12	25% SKIN THICKNESS	3	25% SKIN THICKNESS	5
13	25% SKIN THICKNESS	2	25% SKIN THICKNESS	2
14	0.006	4	0.006	6
15	20% SKIN THICKNESS	4	20% SKIN THICKNESS	6
16	25% SKIN THICKNESS	4	25% SKIN THICKNESS	6
17	15% SKIN THICKNESS	4	15% SKIN THICKNESS	6
18	25% SKIN THICKNESS	4	25% SKIN THICKNESS	6
19	0.015	UNLIMITED	0.015	UNLIMITED
20	25% SKIN THICKNESS	5	25% SKIN THICKNESS	6
21	UNLIMITED	UNLIMITED	UNLIMITED	UNLIMITED
22	HONEYCOMB		HONEYCOMB	
23	25% SKIN THICKNESS	5	25% SKIN THICKNESS	6

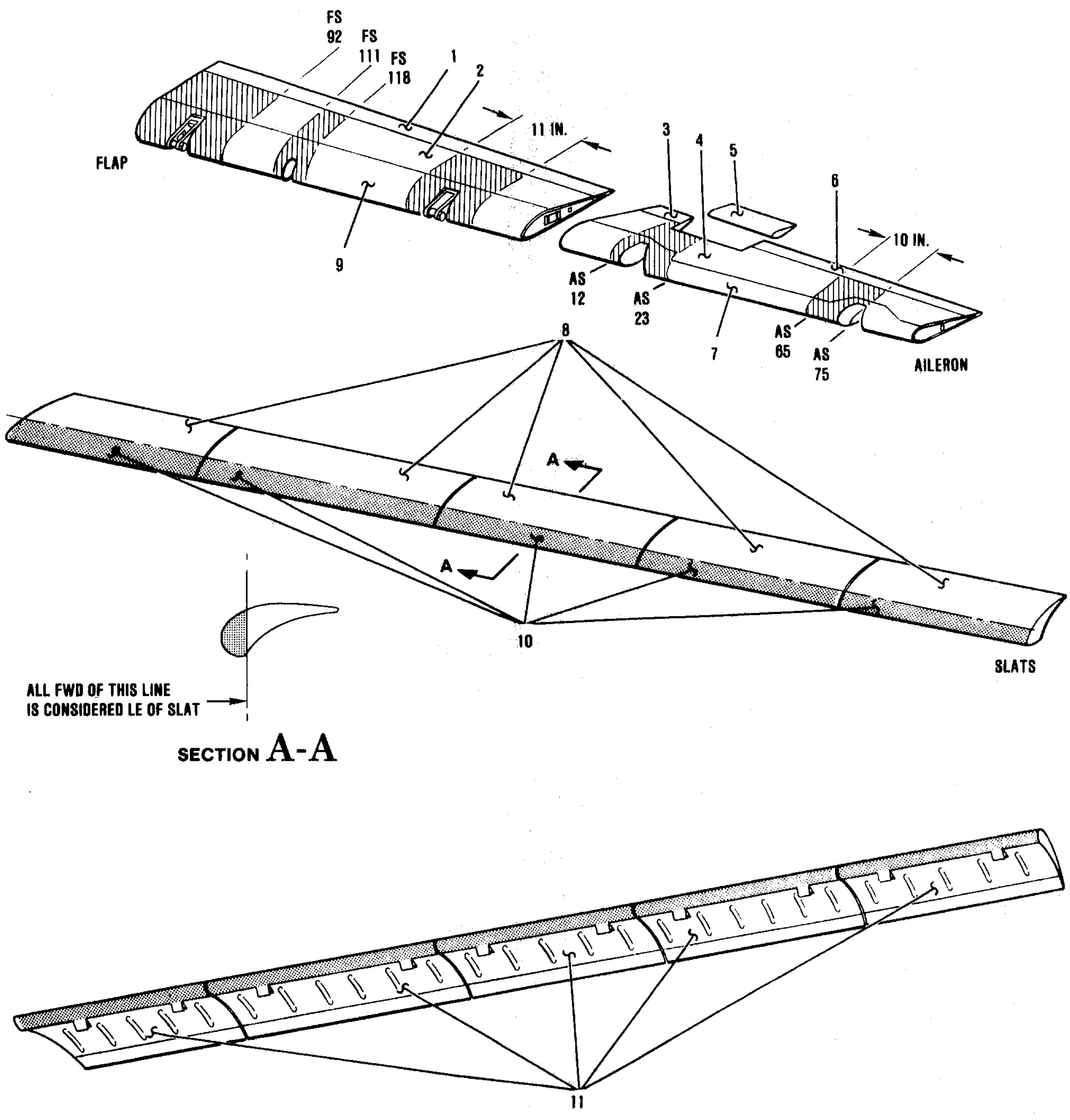


NOTES

- THIS CHART IS APPLICABLE TO ALL AREAS EXCEPT THOSE CODED 6, 10, 11, and 22.
- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.

8265-3-225

Negligible Damage — Wing — Model NA 265-40, -60, -70 and -80 Figure 101 (Sheet 3 of 5)



NOTES

- DAMAGE GIVEN MAY BE CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.
- ALL CROSS-HATCHED AREAS CAN SUSTAIN NO DAMAGE OTHER THAN DENTS OR SCRATCHES.

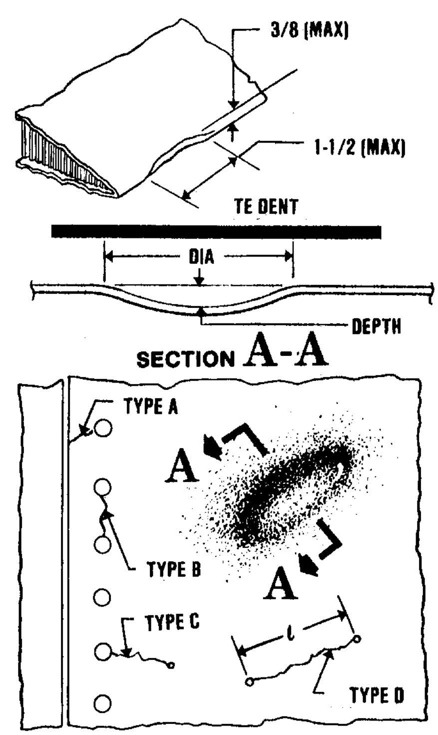
S265-3-226

**Negligible Damage — Wing —
Model NA 265-40, -60, -70, and -80
Figure 101 (Sheet 4 of 5)**

HONEYCOMB NEGLIGIBLE DAMAGE

CODE AREA	SCRATCHES				DENTS			HOLE	
	CHORDWISE		SPANWISE		DIA IN IN.	DEPTH IN IN. (MAX)	UNDAMAGED MATERIAL BETWEEN DENTS	DIA IN IN.	UNDAMAGED MATERIAL BETWEEN HOLES
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.					
1	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX)	5 IN. (MIN)
3	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX)	5 IN. (MIN)
5	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX)	5 IN. (MIN)
6	0.002 0.004	3 2	0.002 0.004	UNLIMITED UNLIMITED	1 2 3 (MAX)	0.020 0.035 0.050	3 3 4	1/2 (MAX)	5 IN (MIN)

CODE AREA	CRACKS A AND HOLES B			
	TYPE A	TYPE B	TYPE C	TYPE D
2	1 ALLOWED PER EA 25 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	ℓ = 3/4 IN. LIMIT OF 3 PER EA SURFACE
4	1 ALLOWED PER EA 25 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EACH 20 GOOD RIVETS	ℓ = 3/4 IN. LIMIT OF 3 PER EA SURFACE
7	NONE	NONE	NONE	NONE
8	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	ℓ = 1 IN. LIMIT OF 2 PER SLAT
9	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	ℓ 1 IN. LIMIT OF 3 PER EA SURFACE
10	NONE	1 ALLOWED PER EA 20 GOOD RIVETS	NONE	ℓ = 1 IN. LIMIT OF 2 PER SLAT
11	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EA 20 GOOD RIVETS	1 ALLOWED PER EACH 20 GOOD RIVETS	ℓ = 1 IN. LIMIT OF 2 PER SLAT



CODE AREA	SCRATCHES			
	CHORDWISE		SPANWISE	
	DEPTH IN IN.	LENGTH IN IN.	DEPTH IN IN.	LENGTH IN IN.
2	0.002	7	0.002	UNLIMITED
4	0.002	7	0.002	UNLIMITED
7	0.002	7	0.002	UNLIMITED
8	0.002	7	0.002	UNLIMITED
9	0.002	7	0.002	UNLIMITED
10	0.002	7	0.002	UNLIMITED
11	0.003 EXCEPT AT BEAD 0.001 AT BEAD	7	0.003 EXCEPT AT BEAD 0.001 AT BEAD	UNLIMITED

DENTS C					
CODE AREA	DIA IN IN.	DEPTH IN IN. (MAX)	CODE AREA	DIA IN IN.	DEPTH IN IN. (MAX)
2	1 2 3 (MAX)	1/64 3/64 1/16	9	1/8 1/4 3/8	0.020 0.040 0.063
4	1 2 3 (MAX)	1/64 3/64 1/16	10	1/8 1/4 3/8	0.020 0.040 0.063
7	1/8 1/4 3/8	0.020 0.040 0.063 (MAX)	11	1 2 3	1/64 3/64 1/16
8	1 2 3	1/64 3/64 1/16			

NOTES

- DAMAGE GIVEN IS CONSIDERED NEGLIGIBLE AFTER TREATMENT AS DESCRIBED IN 51-70-70.

A A COMBINATION OF ONLY TWO OF ABOVE CRACKS MAY EXIST AT SAME TIME IN ANY ONE BAY, WITH EXCEPTION OF TYPE D, WHICH IS LIMITED TO ONE PER BAY

B NEGLIGIBLE HOLE DIA AND OTHER LIMITS ARE SAME AS THOSE GIVEN FOR TYPE D CRACKS.

C MEASURE DIA OF DENTS AS SHORTEST DISTANCE ACROSS DENT. DENTS MUST BE GENERALLY SMOOTH AND WITHOUT ABRUPT CHANGES IN CONTOUR.

S265-3-227

Negligible Damage — Wing —
Model NA 265-40, -60, -70, and -80
Figure 101 (Sheet 5 of 5)

MAIN FRAME

STRUCTURAL IDENTIFICATION

GENERAL

This section contains the repair index for the fixed structure of the wing that includes the box section, the leading edge, trailing edge and the wing tip. See figures 1 and 2.

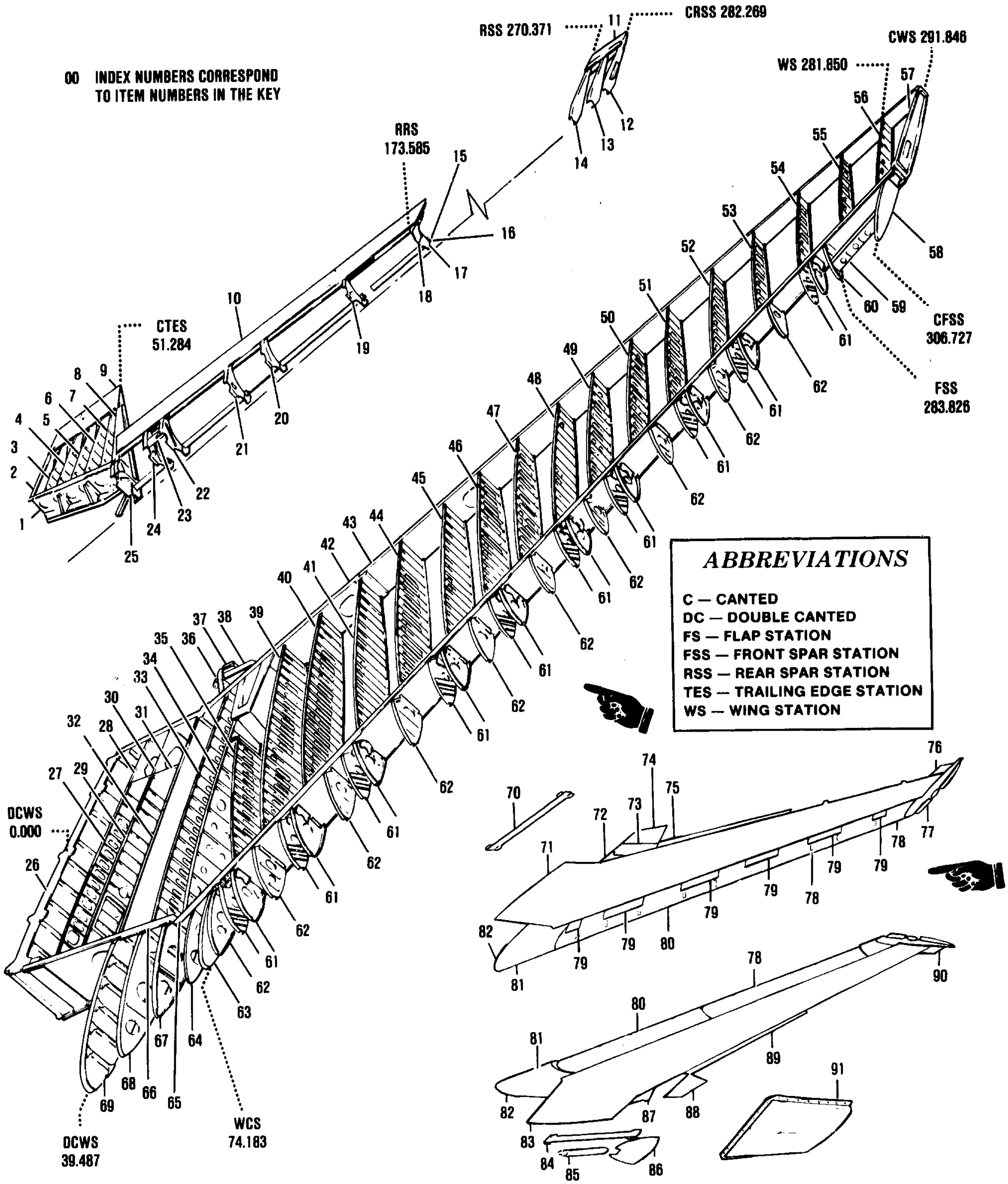


Figure 1 — Wing Fixed Structure Repair Index —
Model NA 265-40, -60, -70, and -80

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1		Beam — Wing TE			
	265-130006-49	Web	7075-T6 Clad	0.032	
	265-130006-53	Cap	2024-T42 Extr	4E755	
2	265-130006-67	Rib — TECS 30.079	7075-T6 Clad	0.063	57-10-20, Fig 212
3	265-130006-55	Rib — TES 33.884	2024-T42 Clad	0.032	57-10-20, Fig 212
4	265-130006-57	Rib — TES 38.585	2024-T42 Clad	0.032	57-10-20, Fig 212
5	265-130006-59	Rib — TES 43.286	2024-T42 Clad	0.032	57-10-20, Fig 212
6	265-130006-61	Rib — TES 47.997	2024-T42 Clad	0.032	57-10-20, Fig 212
7	265-130006-63	Rib — TECS 49.619	2024-T42 Clad	0.032	57-10-20, Fig 212
8	265-130006-65	Rib — TECS 51.284	7075-T6 Clad	0.032	57-10-20, Fig 212
9	246-14056-11	Panel — Inbd TE			
	246-14056-3	Skin	2024-T4 Clad	0.010	
	246-14056-13	Core	5052-H39 Honeycomb	3/16 x 0.001	
	246-14056-27	Channel	7075-T6 Clad	0.063	
10	265-131103	Panel — Intermediate TE			
	265-131103-3	Skin	2024-T3 Clad	0.010	
	265-131103-5	Core	5052-H39 Honeycomb	3/16 x 0.001	
	265-131103-9	Channel	2024-T42 Clad	0.020	
11	265-131106	Panel — Outbd TE			
	265-131106-3	Skin	2024-T3 Clad	0.010	
	265-131106-5	Channel	2024-T42 Clad	0.020	
	265-131106-9	Core	5052-H39 Honeycomb	3/16 x 0.001	
12	265-130268	Rib — RSCS 282.269	2024-T42 Clad	0.020	
13	265-130267	Rib — RSCS 275.830	2024-T42 Clad	0.020	
14	265-130266	Rib — RSCS 269.661	2024-T42 Clad	0.020	
15	265-130007-27	Retainer — Seal	2024-T42 Clad	0.032	
16	265-130957-4	Seal	Fabric-covered Sponge Rubber		
17	265-130007-13	Angle	2024-T42 Clad	0.020	
	265-130007-15	Angle	2024-T42 Clad	0.032	
	265-130007-17	Angle	2024-T42 Clad	0.025	
18	265-130256	Rib — RSS 173.585	7075-T6 Clad	0.050	
19	265-130255	Rib — RSS 152.450	7075-T6 Clad	0.050	
20	265-130254	Rib — RSS 127.758	7075-T6 Clad	0.050	
21	265-130253	Rib — RSS 113.758	7075-T6 Clad	0.050	
22	265-130252	Rib — RSS 94.758	7075-T6 Clad	0.050	
23	265-130303	Intercostal — RSS 89.070 to RSS 94.758	2034-T43 Clad	0.040	
24	265-130251	Rib — RSS 89.070	7075-T6 Clad	0.050	
25	265-130257	Rib Assy — RSS 85.507			
	265-130257-3	Rib	7075-T6 Clad	0.040	
	265-130257-5	Doubler	2024-T42 Clad	0.040	
	265-130257-5	Channel	2024-T42 Clad	0.040	
26	265-130073-21	Rib — WS 0.000	7079-T6 Forging		
	265-130073-41	Rib — WS 0.000	7049-T73 Forging		
27	265-130375-1	Rib — WCS 12.322	2024-T42 Clad	0.050	57-10-20, Fig 206
28	265-130051-1	Rib — WCS 12.322	7075-T6 Machined Plate		
29	265-130378-1	Rib — WCS 24.644	2024-T42 Clad	0.050	57-10-20, Fig 206
30	265-130052-1	Rib — WCS 24.644	7075-T6 Machined Plate		

NOTE

For additional repairs, refer to 51-70-00.

S265-3-240A

Key to Figure 1 (Sheet 1 of 3)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
31	265-130303-1	Intercostal — Fuel Baffle	2024-T42 Clad	0.032	
32	265-130076-1	Rib — WDCS 37.890	7075-T6 Machined Plate		
33	265-130353-1	Rib — WCS 47.890	2024-T42 Clad	0.050	57-10-20, Fig 206
34	265-130054-11	Rib — WCS 59.095	7075-T6 Clad	0.080	
35	265-130355-1	Rib — WS 65.810	2024-T42 Clad	0.050	
36	265-130258-11	Rib — WDCS 24.082	7079-T651 Machined Plate		57-10-20, Fig 214
	285-130258-11	Rib — WDCS 24.082	7049-T73 Machined Plate		57-10-20, Fig 214
37	265-335551	Fitting — MLG Uplock (Ref)			
38	265-130913	Support — Upper TE Skin	7075-T6 Extr	4E383	
	265-130914	Support — Lower TE Skin	7075-T6 Extr	4E697	
	265-130915	Support — Lower TE Skin	7075-T6 Extr	4E697	
39	265-130356	Rib — WS 79.070	2024-T42 Clad	0.050	57-10-20, Fig 206
40	265-130357	Rib — WS 92.230	2024-T42 Clad	0.063	
	265-130357-3	Web	2024-T42 Clad	0.063	57-10-20, Fig 206
	265-130357-5 and -7	Cap	7075-T6 Extr	1E733	
41	265-130358	Rib — WS 105.990	2024-T42 Clad	0.050	
	265-130358-3	Web	2024-T42 Clad	0.050	57-10-20, Fig 206
	265-130358-5	Cap	7075-T6 Extr	1E733	
	265-130358-7	Doubler	2024-T42 Clad	0.040	
42	265-130017-21	Spar — Inbd Rear	7079-T6 Forging		
	265-130017-31	Spar — Inbd Rear	7049-T73 Forging		
43	265-130004-1	Spar — Outbd Rear	7079-T651 Machined Plate		
	265-130004-3	Spar — Outbd Rear	7075-T73510 Machined Plate		
44	265-130359-1	Rib — WS 119.850	2024-T42 Clad	0.040	57-10-20, Fig 206
45	265-130360-1	Rib — WS 133.910	2024-T42 Clad	0.040	57-10-20, Fig 206
46	265-130361-1	Rib — WS 146.480	2024-T42 Clad	0.040	57-10-20, Fig 206
47	265-130362	Rib — WS 159.080	2024-T42 Clad	0.040	57-10-20, Fig 206
48	265-130363	Rib — WS 171.620	2024-T42 Clad	0.063	57-10-20, Fig 206
49	265-130364	Rib — WS 185.050	2024-T42 Clad	0.040	57-10-20, Fig 206
50	265-130365	Rib — WS 198.350	2024-T42 Clad	0.040	57-10-20, Fig 206
51	265-130366	Rib — WS 211.750	2024-T42 Clad	0.040	57-10-20, Fig 206
52	265-130367	Rib — WS 225.750	2024-T42 Clad	0.040	57-10-20, Fig 206
53	265-130368	Rib — WS 239.850	2024-T42 Clad	0.040	57-10-20, Fig 206
54	265-130369	Rib — WS 254.350	2024-T42 Clad	0.050	57-10-20, Fig 206
55	265-130370	Rib — WS 268.850	2024-T42 Clad	0.050	57-10-20, Fig 206
56	265-130371	Rib — WS 281.850	2024-T42 Clad	0.050	57-10-20, Fig 206
57	265-130372-11	Rib — WS 291.846	TENS 50-T6 Sand Casting		
58	265-130015-7	Rib — FSCS 306.727	2024-T42 Clad	0.032	
59	265-130015-9	Intercostal	2024-T42 Clad	0.032	
60	265-130015-5	Rib — FSS 293.826	2024-T42 Clad	0.032	
61	265-130234	Rib — Track Roller Support	7075-T6 Clad	0.040	
62	265-130214	Rib — Air-load	2024-T42 Clad	0.020	
63	265-130203-3	Rib — WCS 74.183	7079-T651 Machined Plate		
	265-130203-17	Rib — WCS 74.183	7075-T73510 Machined Plate		

NOTE

For additional repairs, refer to 51-70-00.

S265-3-240A

Key to Figure 1 (Sheet 2 of 3)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
64	265-130202-15	Rib — WCS 65.502	2024-T42 Clad	0.032	
65	265-130003-5	Spar — Outbd Front	7079-T611 Forging		57-10-20, Fig 204, 57-10-20, Fig 205 57-10-20, Fig 203
	265-313003-9	Spar — Outbd Front	7075-T73510 Extruded Bar		
66	265-130016-11	Spar — Inbd Front	7079-T611 Forging		
	265-130016-21	Spar — Inbd Front	7049-T73 Forging		
67	265-130202-11	Rib — WCS 56.121	2024-T42 Clad	0.032	
68	265-130202-1	Rib — WCS 46.879	2024-T42 Clad	0.032	
69	265-130201	Rib — WDCS 39.487	7079-T611 Forging		
	265-130201-23	Rib — WDCS 39.487	7049-T73 Forging		
70	265-100026	Plate — Wing Joint Splice	7178-T6 Machined Plate		
71	370-130121-1	Skin — Wing Panel, Upper	7178-T651 Machined Plate		57-30-20, Fig 205 57-30-20, Fig 204, Fig 206
72	265-130103-1	Skin — Inbd TE, Upper	7075-T6 Machined Plate		
73	265-131102-11	Panel — Wing Inbd TE			
	265-131102-25	Skin — Outer	7075-T6 Bare	0.040	
	265-131102-27	Skin — Inner	7075-T6 Bare	0.040	
	265-131102-23	Core	5052H39 Honeycomb	3/16 x 0.0001	
74	265-130006-3	Skin — Wing Inbd TE, Upper	7075-T6 Clad	0.032	57-30-20, Fig 203
75	265-130007-3	Skin — Wing Intermediate TE, Upper	2024-T3 Clad	0.020	57-30-20, Fig 205
76	265-130014-3	Skin — Wing Outbd TE, Upper	2024-T42 Clad	0.040	
77	265-150002-11	Tip — Wing Panel Assy			
	265-150003	Structure Assy	Glass Fabric		
	265-150004	Cap Assy	6061-T6 Bare	0.063 & 0.125	
78	265-130015-3	Skin — Wing Outbd LE	2024-T3 Clad	0.063 A	
79	265-130806	Door — Wing Intermediate LE, Upper	7075-T6 Clad	0.063	
80	265-130010	Wing LE —Intermediate			
	265-130010-3 and -5	Skin	2024-T3 Bare	0.063 A	57-30-20, Fig 214 Fig 215
	265-130010-43 thru -99	Stiffener	2024-T42 Clad	0.020	
81	265-130106-11	Skin — Wing Inbd LE	7075-T6 Bare	0.125 A	
82	265-130951-1	Seal Assy — Wing-to-Fuselage (Ref)			
83	370-130122-1	Skin — Wing Panel, Lower	2024-T351 Machined Plate		57-30-20, Fig 208, Fig 209 57-30-20, Fig 210, Fig 211
84	265-100040	Plate — Wing Joint Splice	7178-T6 Machined Plate		

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

S265-3-240A

Key to Figure 1 (Sheet 3 of 4)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
85	265-100031	Skin — Wing Panel, Center	TENS 50-T6 Sand Casting		
86	265-131001-17	Skin — Fairing Wing-to-Fuselage, Lower	2024-T42 Bare	0.063 A	
87	265-130104-1	Skin — Wing Inbd TE, Lower	7075-T6 Bare	0.071 A	
88	265-130006-5	Skin — Wing Inbd TE, Lower	7075-T6 Clad	0.032	57-30-20, Fig 203
89	265-130007-5, -7 and -9	Skin — Wing Intermediate TE Lower	2024-T3 Clad	0.020	
90	265-130014-5	Skin — Wing Outbd TE, Lower	2024-T42 Clad	0.040	
91	370-131001	Fairing — Fuselage, Lower	Fiberglass Laminates		51-70-50

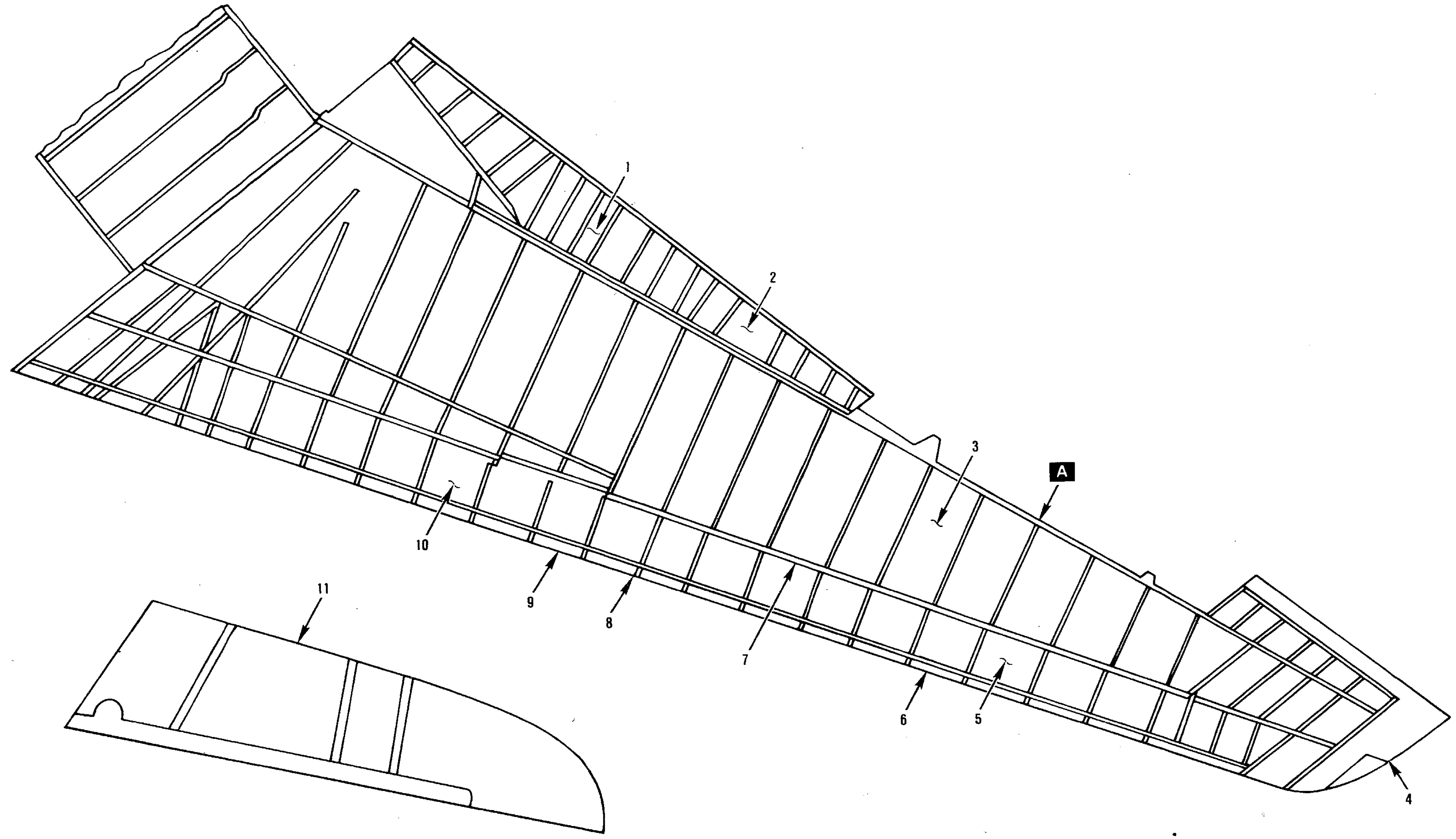
NOTES

For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

S265-3-240A

Key to Figure 1 (Sheet 4 of 4)



NOTE

A REFER TO FIGURE 1 FOR MAIN BOX STRUCTURE BREAKDOWN

Wing Repair Index —
Model NA 265-60A, -60SC, -65, -80A, and -80SC
Figure 2

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION
1	76-57375-9, -10	Panel Assy, Spoiler, Inbd
2	76-57375-3, -4	Panel Assy, Spoiler, Outbd
3	265-130121	Upper Skin, Inst
	265-130122	Lower Skin, Inst
	370-130121	Upper Skin, Inst
	370-130122	Lower Skin, Inst
4	76-57201	Extended Wing Assy
5	76-57427	Tank Inst LE, Outbd
6	76-57425	LE Skin Inst Outbd
7	76-57402	Front Spar
8	76-57496	Fence Assy
9	76-57424	LE Skin Inst Inbd
10	76-57426	Tank Inst, LE, Inbd
11	76-57412	Overwing Fairing

Key to Figure 2

MAIN FRAME

REPAIRS

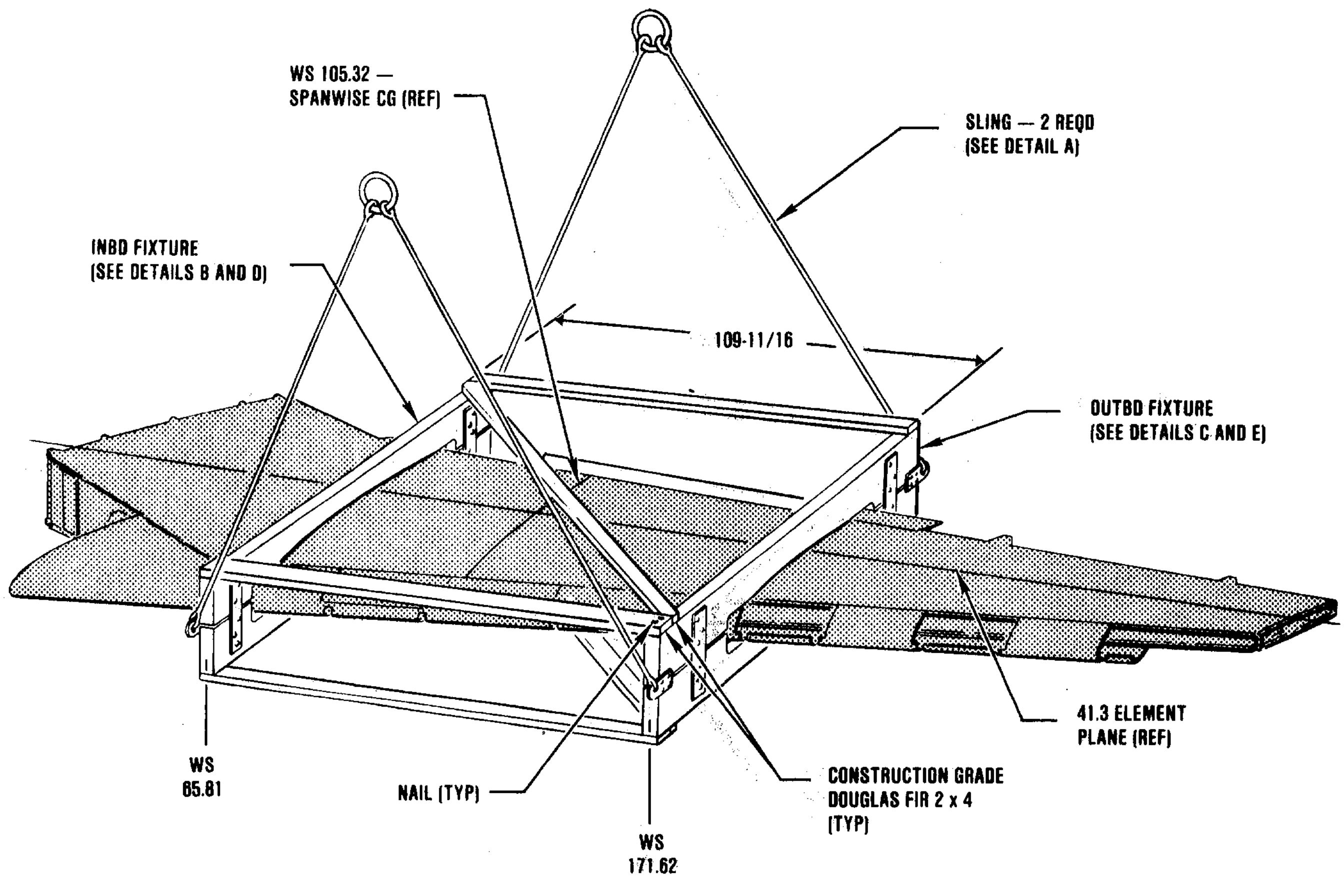
GENERAL

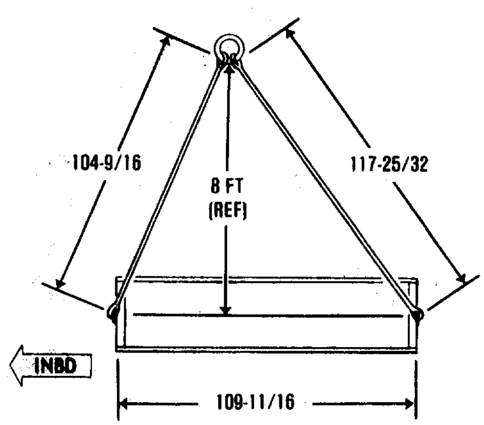
This section contains repairs for the fixed structure of the wing. For applicability of repairs, refer to section 57-10-00.

ROTATING THE WING

The wing rotating fixture shown in figure 201 consists primarily of two sets of wooden cradles that clamp around the main box section at WS 65.81 and 171.62. The fixture is attached to the wing while it rests on a wing stand (bottom down). Two slings and two hoists are used for inverting the wing. One each is attached to the LE and TE of the fixture. Both hoists lift the wing uniformly off the stand. Then the leading edge hoist remains fixed while the TE is raised until the wing is suspended, LE down, from the single hoist. The LE slings are then removed and reinstalled on the opposite (lower) side of the wing. Tension is taken on the LE slings and the TE is lowered until the wing is in an approximately level position (lower skin up). The wing is held in this position while the wing holding fixture is assembled under it. (See figure 202.)

Repair data is shown in figures 203 thru 214.





SLING DIMENSIONS —
MAKE SLINGS FROM
1/4 DIA STEEL CABLE

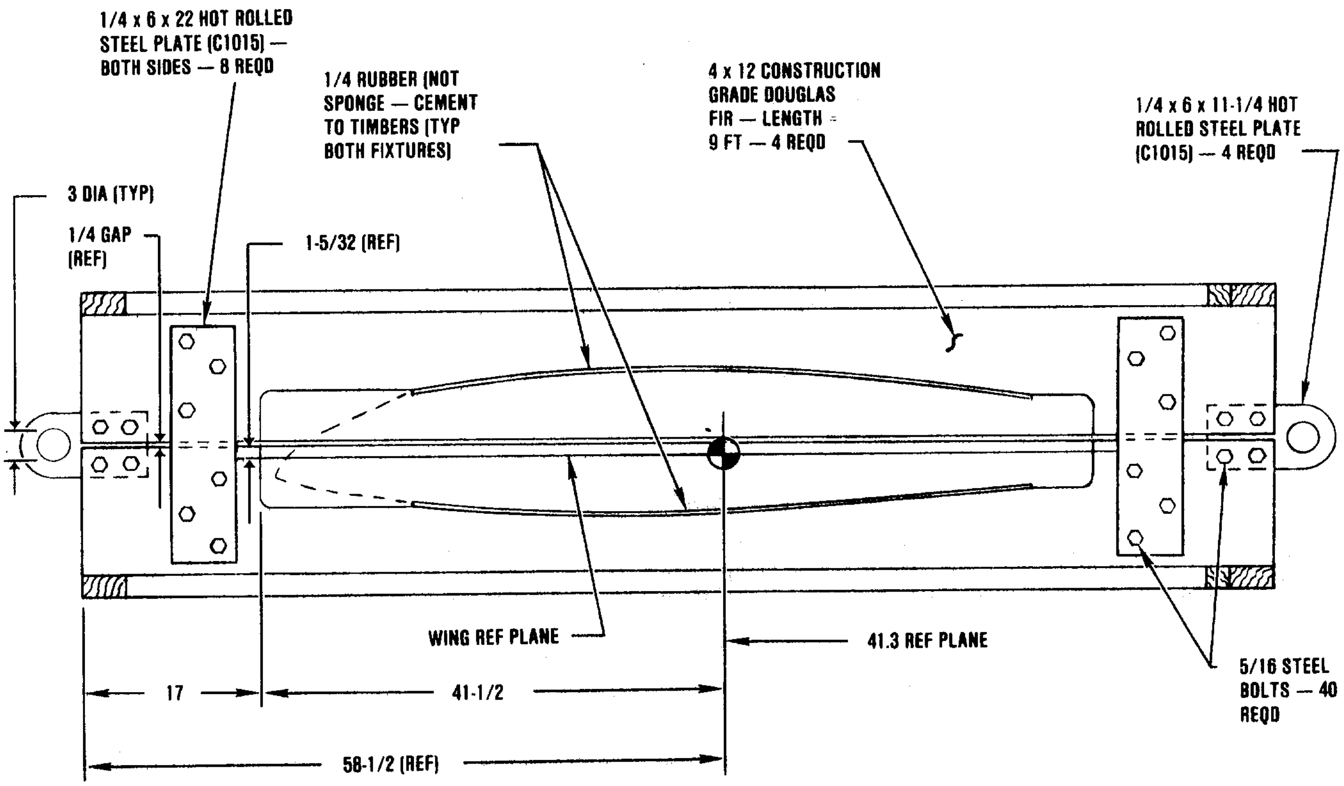
DETAIL A

NOTE

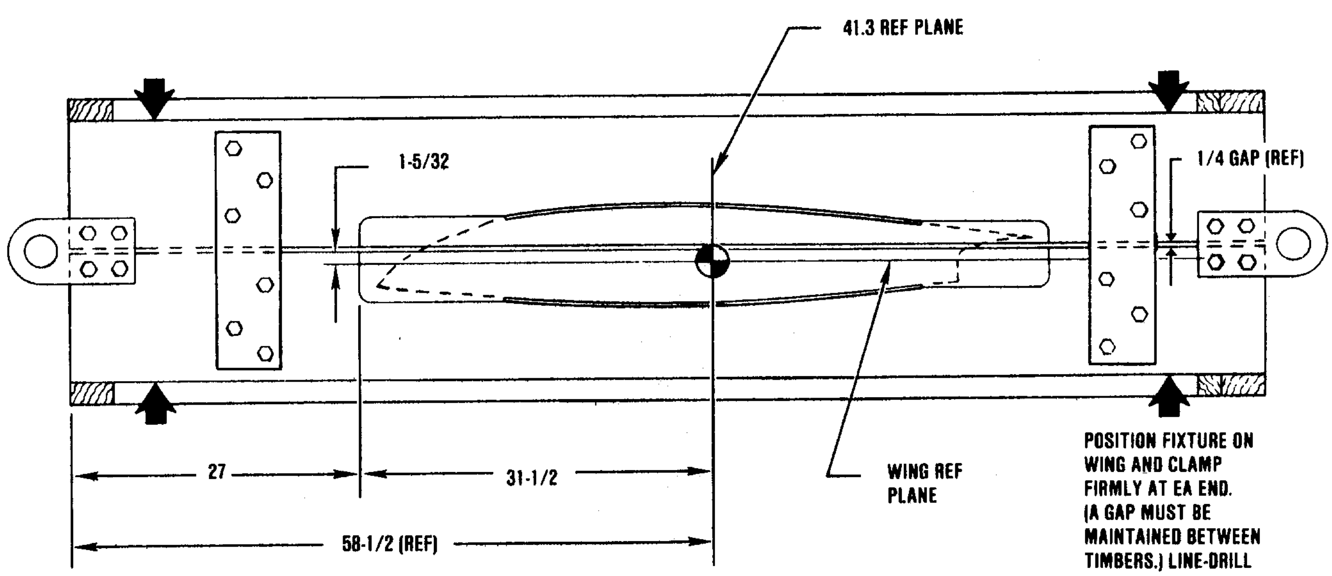
THIS ILLUSTRATION PRESENTS A SUGGESTED METHOD OF BUILDING A FIXTURE FOR INVERTING A WING PANEL IN ORDER TO PLACE IT, LOWER SKIN UP, ON A HOLDING FIXTURE. PROCEDURES FOR ROTATING (INVERTING) WING ARE GIVEN IN "ROTATING THE WING".

S265-3-228

Wing Rotating Fixture
Figure 201 (Sheet 1 of 3)



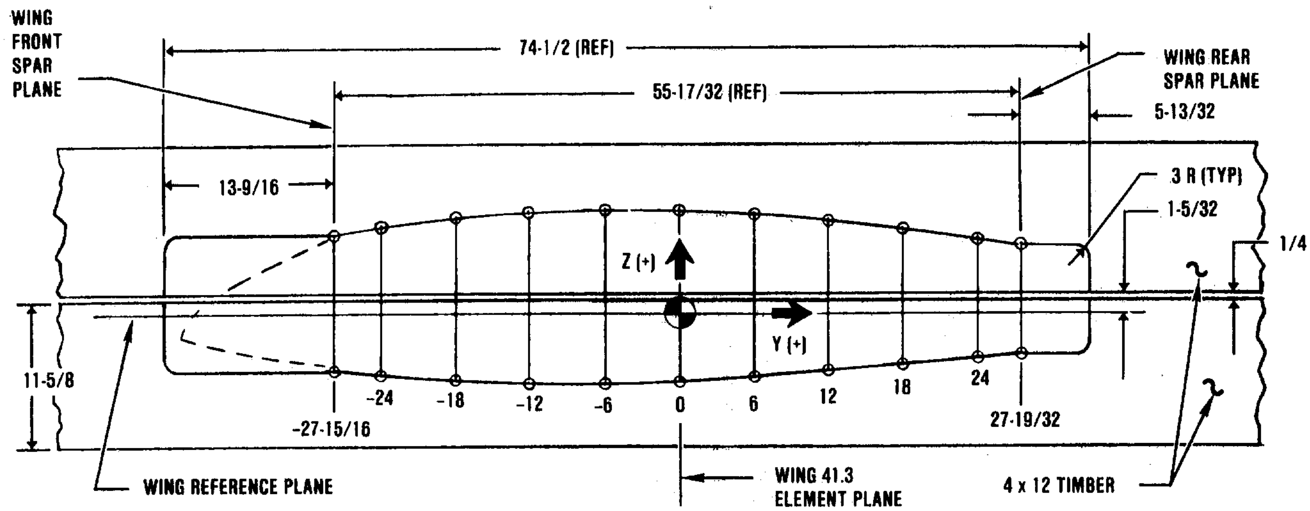
DETAIL B WS 65.81



DETAIL C WS 171.62

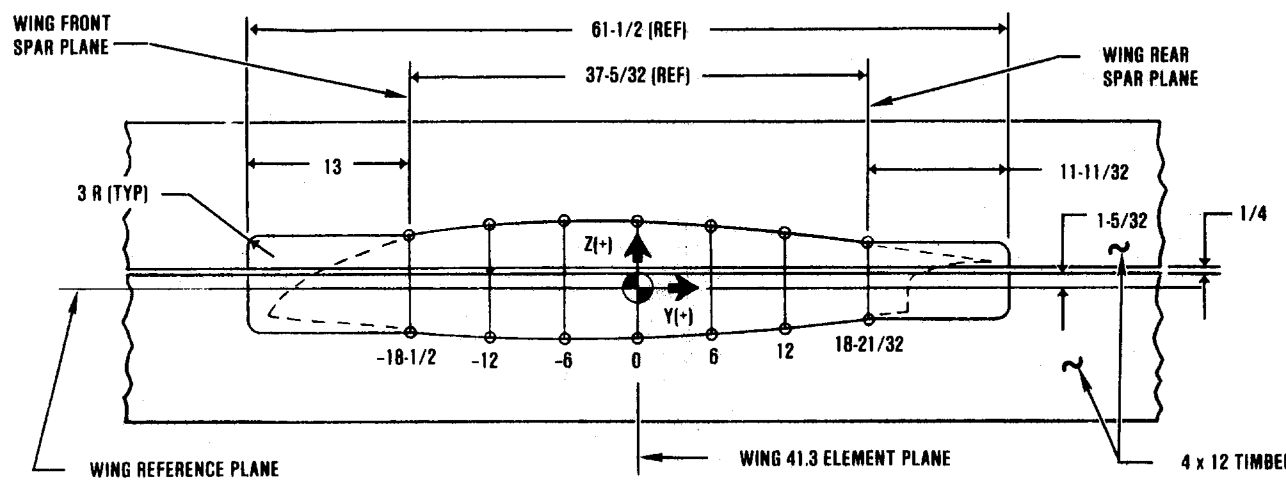
S265-3-229

Wing Rotating Fixture
Figure 201 (Sheet 2 of 3)



REF AXIS	DISTANCE ALONG AXIS IN IN.										
Y	0	-6	-12	-18	-24	-27-15/16	6	12	18	24	27-19/32
Z UPPER	8-1/32	8-3/32	7-7/8	7-13/32	6-11/16	6-1/32	7-23/32	7-1/4	6-5/8	5-7/8	5-3/8
Z LOWER	-5-11/32	-5-17/32	-5-15/32	-5-1/4	-4-13/16	-4-3/8	-5	-4-1/2	-3-31/32	-3-7/16	-3-1/8

DETAIL **D** WS 65.81



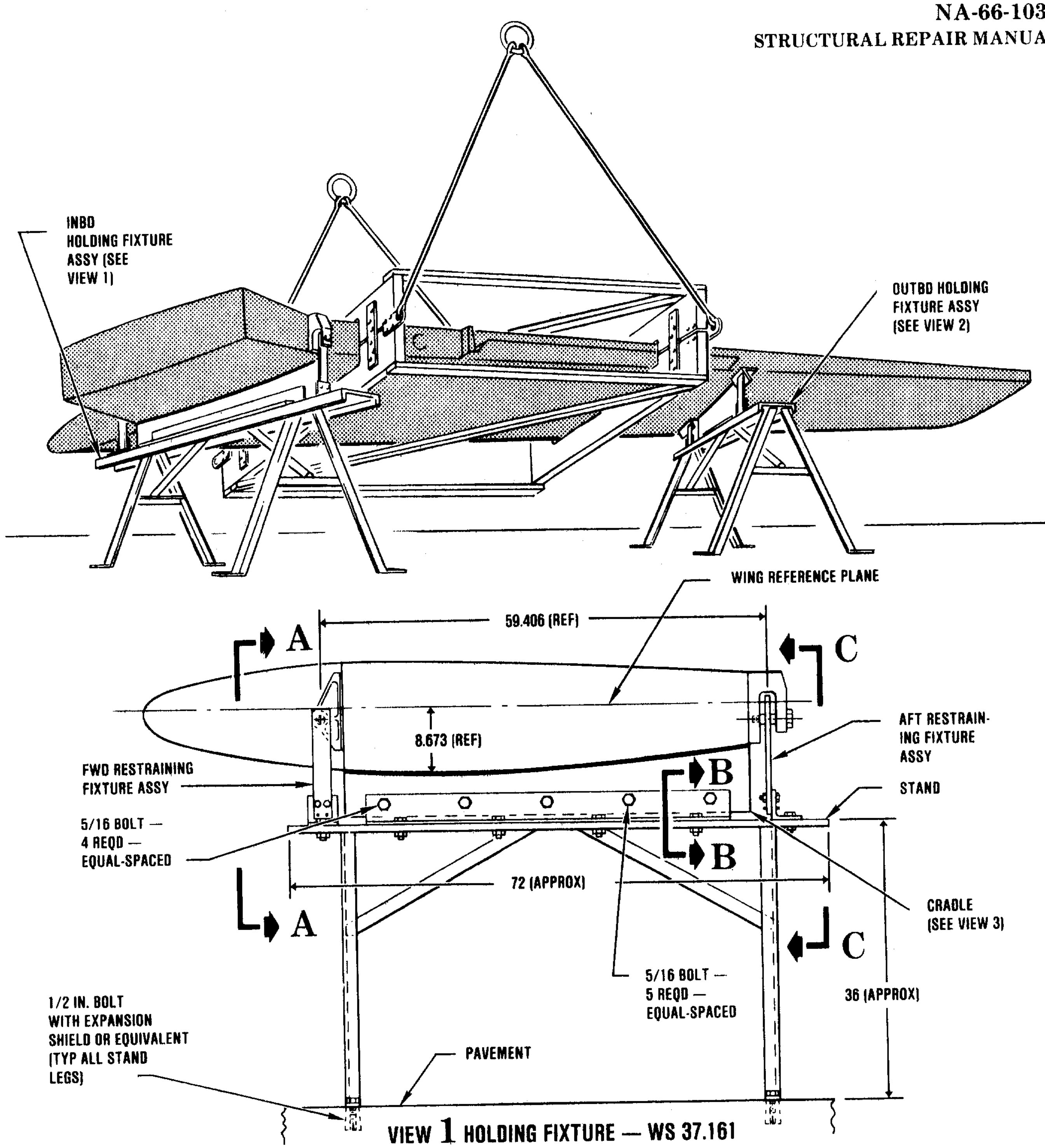
REF AXIS	DISTANCE ALONG AXIS IN IN.						
Y	0	-6	-12	-18-1/2	6	12	18-21/32
Z UPPER	5-3/8	5-13/32	5-1/16	4-9/32	5	4-7/16	3-5/8
Z LOWER	-3-31/32	-4-1/8	-3-15/16	-3-7/16	-3-9/16	-3-1/32	-2-13/32

MOLD LINE DIMENSIONS ALLOW FOR 1/4 IN. RUBBER LINER

DETAIL **E** WS 171.62

S265-3-230

Wing Rotating Fixture
Figure 201 (Sheet 3 of 3)



VIEW 1 HOLDING FIXTURE — WS 37.161

NOTES

THIS ILLUSTRATION PRESENTS A SUGGESTED METHOD OF BUILDING A HOLDING FIXTURE FOR MAINTAINING WING ALIGNMENT DURING WING MAIN BOX LOWER SKIN REMOVAL.

1 THE STANDS ARE ANCHORED TO PAVEMENT. WING IS HELD INVERTED (AND APPROXIMATELY LEVEL) ABOVE STAND, AND CRADLES ARE FITTED TO WING BEFORE BEING BOLTED TO STANDS.

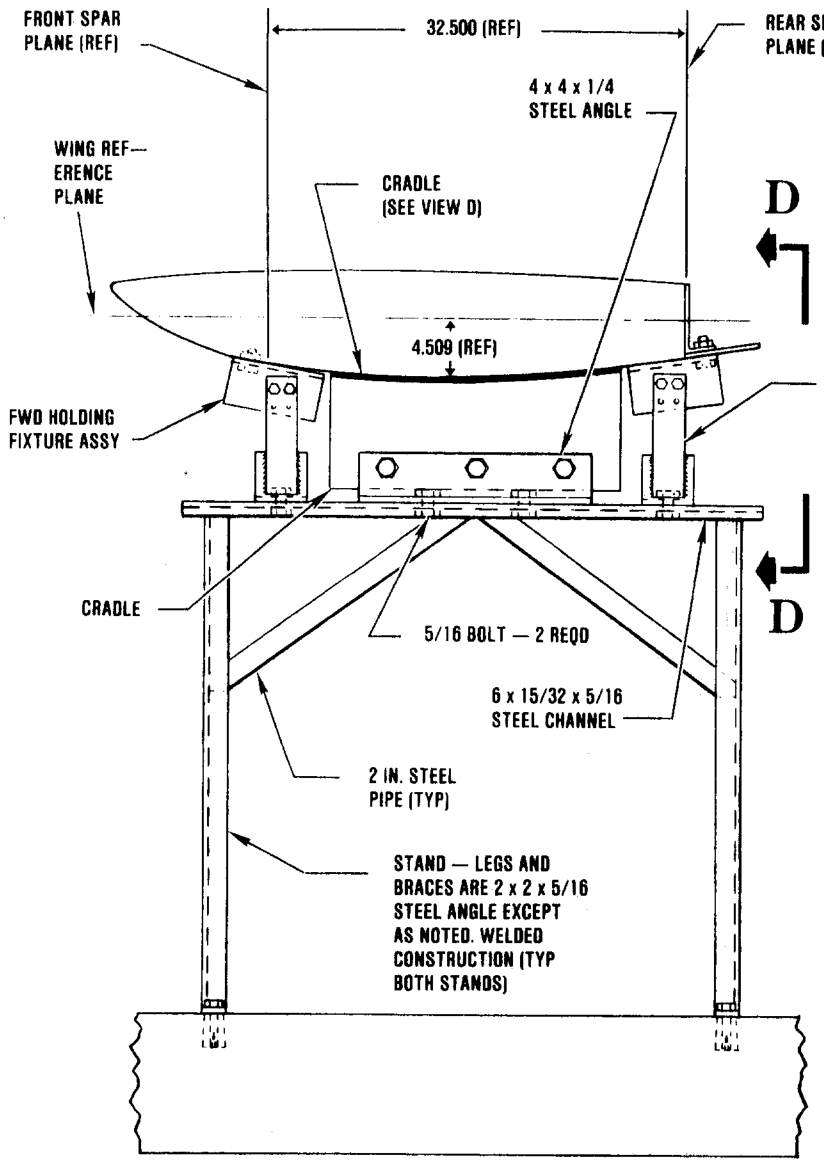
2 WING IS LOWERED ONTO CRADLES AND ROTATING FIXTURE IS REMOVED. (SEE FIGURE 201.)

3 RESTRAINING FIXTURES ARE FITTED TO THE WING AND TO STANDS AND SECURED IN PLACE.

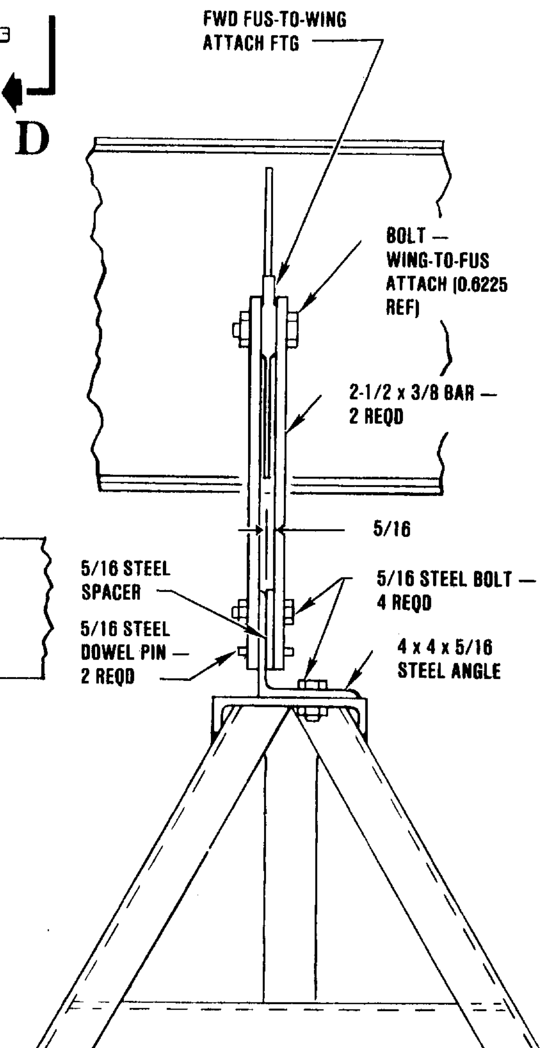
4 SEE 57-30-20, FIGURE 207.

S265-3-287

Holding Fixture — Wing Main Box Section
Figure 202 (Sheet 1 of 4)



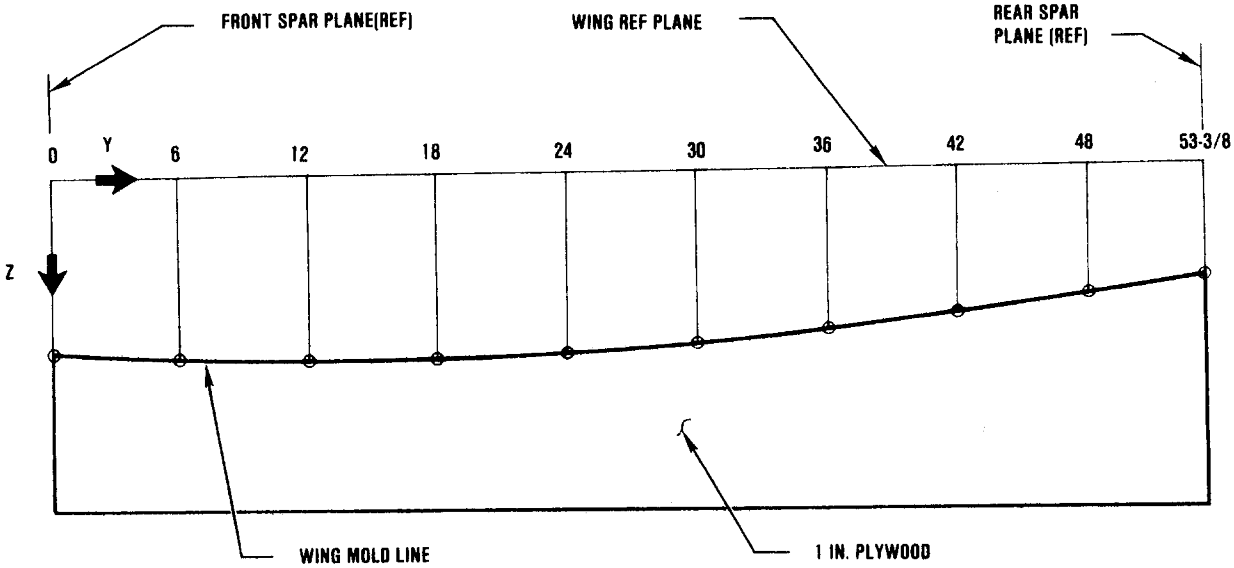
VIEW 2 HOLDING FIXTURE —
WS 198.350



SECTION A-A

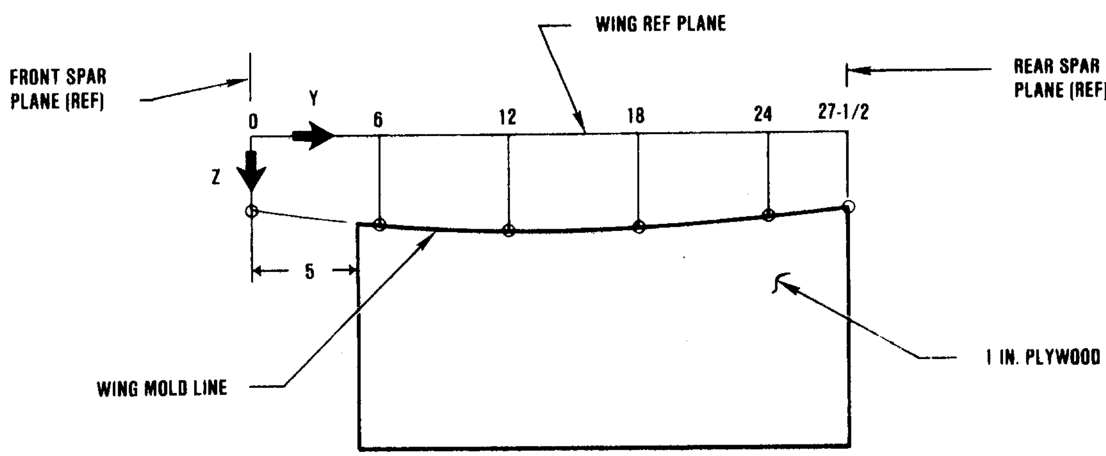
8265-3-290

Holding Fixture — Wing Main Box Section
Figure 202 (Sheet 2 of 4)



AXIS	DISTANCE ALONG AXIS IN IN.									
Y	0	6	12	18	24	30	36	42	48	53-3/8
Z	8-5/32	8-15/32	8-21/32	8-5/8	8-3/8	8	7-15/32	6-27/32	6-1/8	5-3/8

VIEW 3 WING CRADLE — WS 37.161

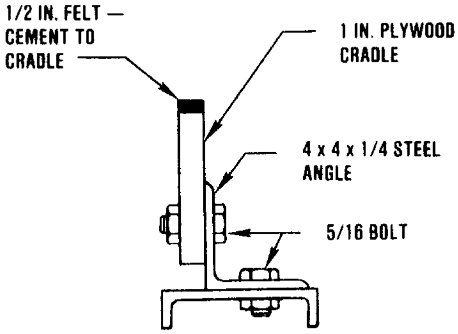


AXIS	DISTANCE ALONG AXIS IN IN.						
Y	0	6	12	18	24	30	32-1/2
Z	3-9/16	4-1/4	4-1/2	4-3/8	3-29/32	3-1/4	2-15/16

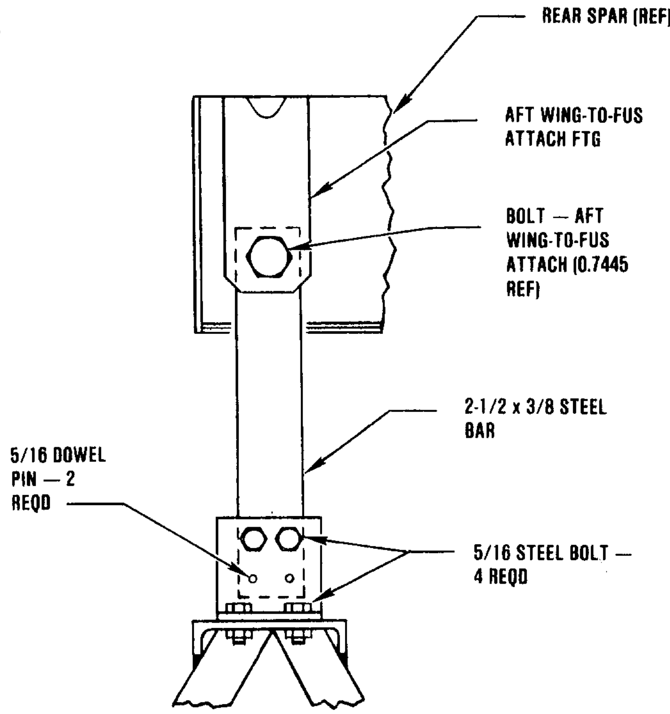
VIEW 4 WING CRADLE — WS 198.350

S265-3-289

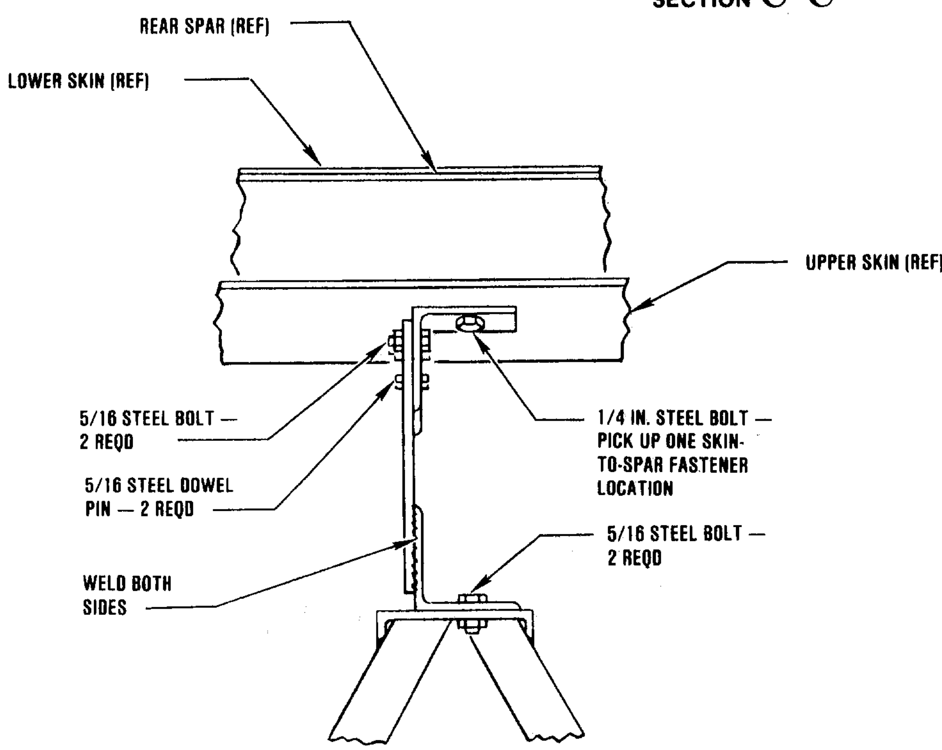
Holding Fixture — Wing Main Box Section
Figure 202 (Sheet 3 of 4)



SECTION B-B



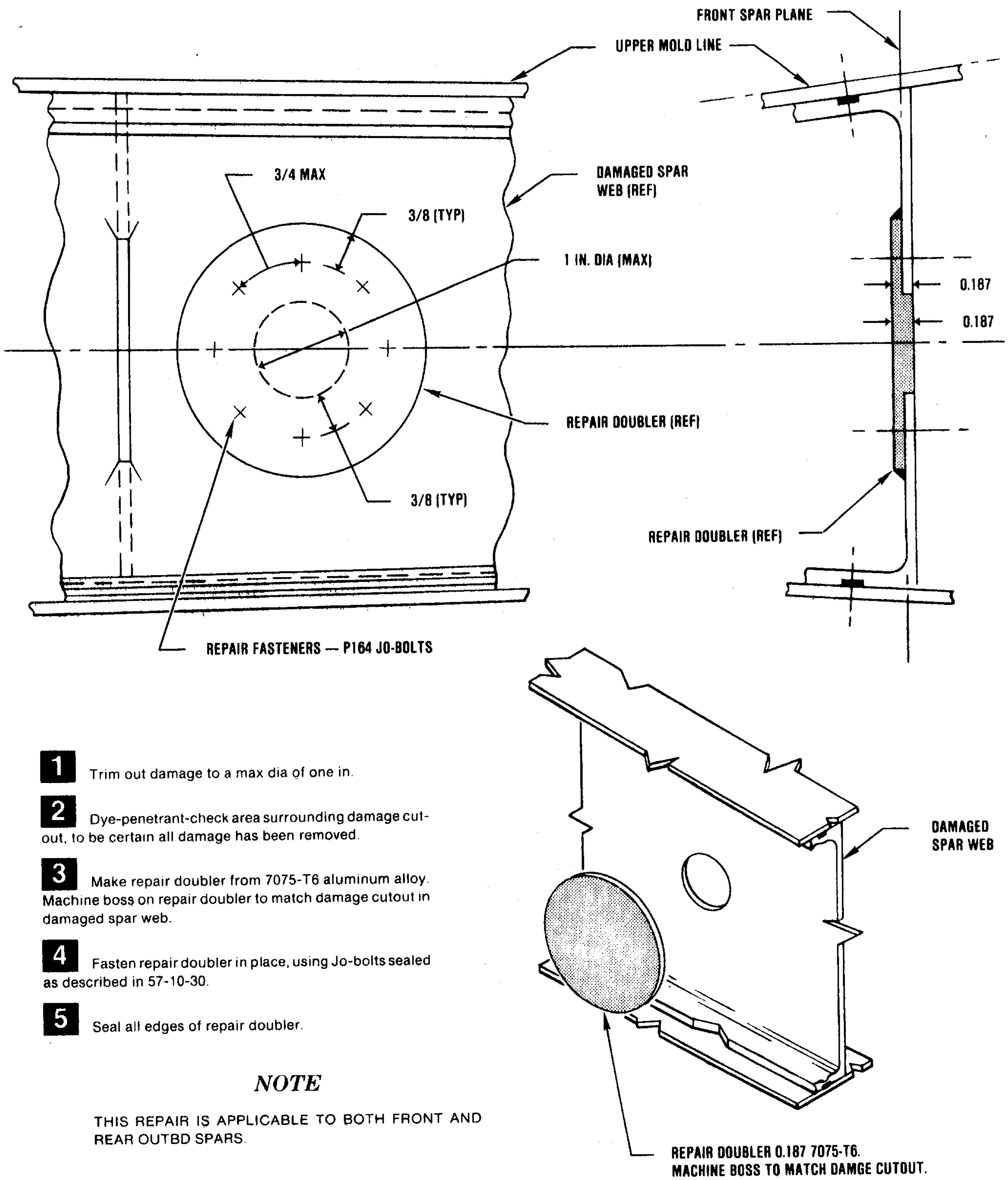
SECTION C-C



SECTION D-D

9265-3-288

Holding Fixture — Wing Main Box Section
Figure 202 (Sheet 4 of 4)



1 Trim out damage to a max dia of one in.

2 Dye-penetrant-check area surrounding damage cut-out, to be certain all damage has been removed.

3 Make repair doubler from 7075-T6 aluminum alloy. Machine boss on repair doubler to match damage cutout in damaged spar web.

4 Fasten repair doubler in place, using Jo-bolts sealed as described in 57-10-30.

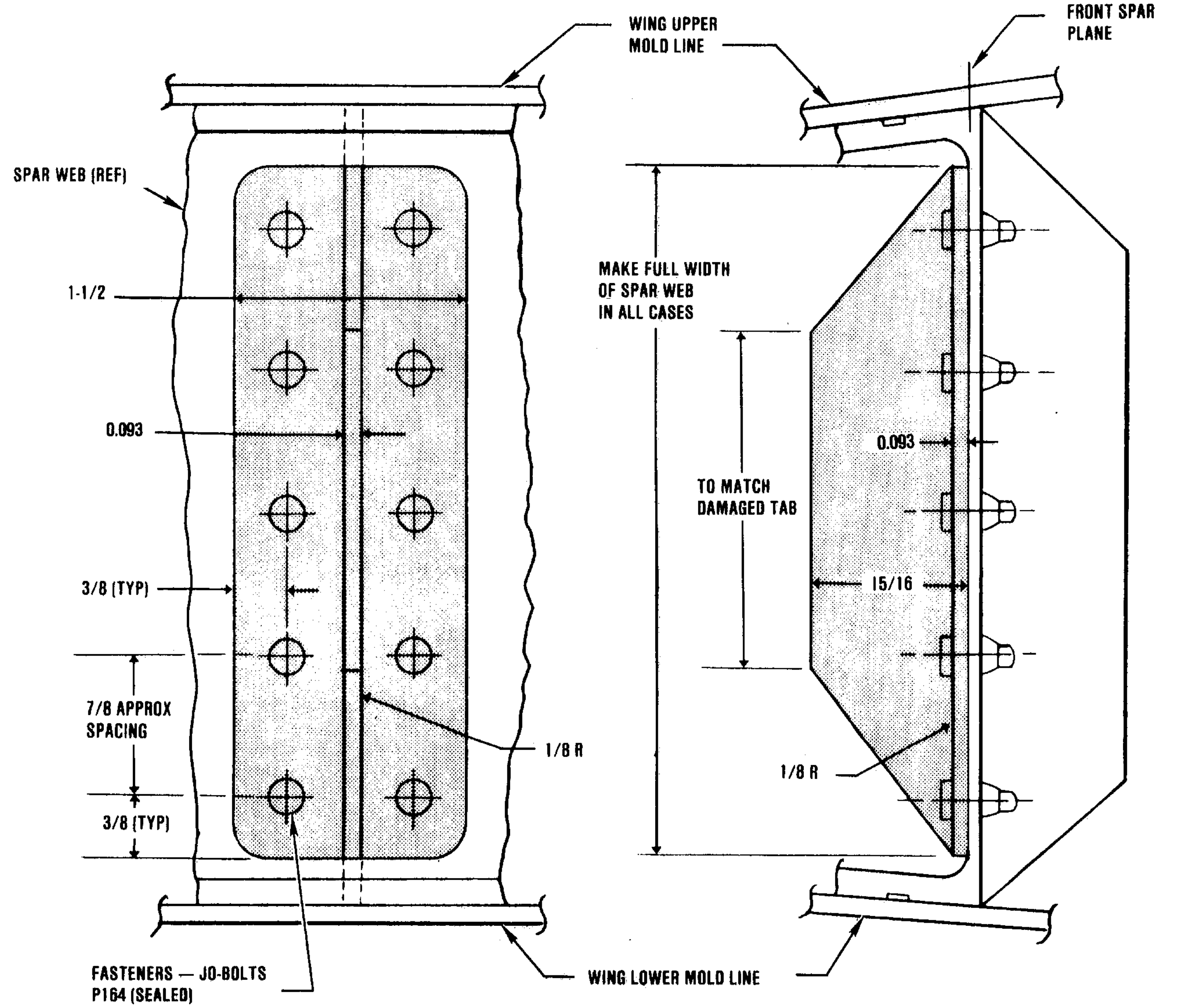
5 Seal all edges of repair doubler.

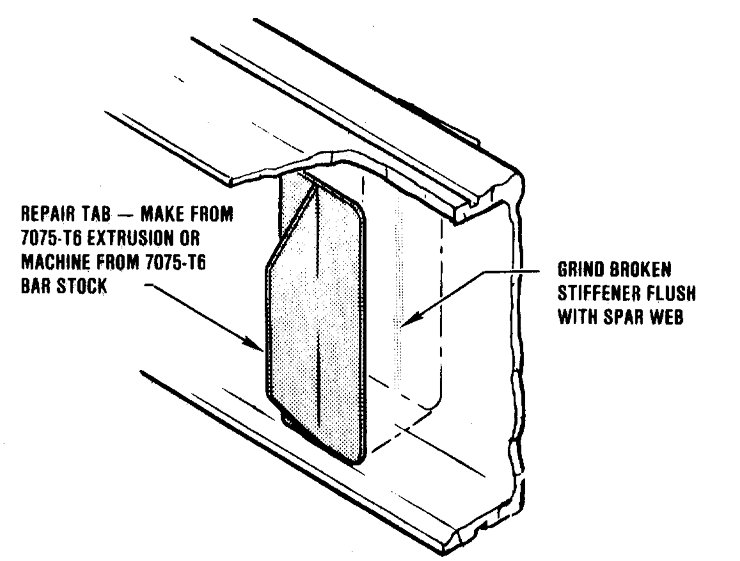
NOTE

THIS REPAIR IS APPLICABLE TO BOTH FRONT AND REAR OUTBD SPARS.

S265-3-247

Front and Rear Spars Web Repair — Outboard
Figure 203





1 Remove broken stiffener from spar by grinding broken stiffener until it is flush with spar web.

2 Make repair tab from 7075-T6 extrusion, or machine it from 7075-T6 bar stock material.

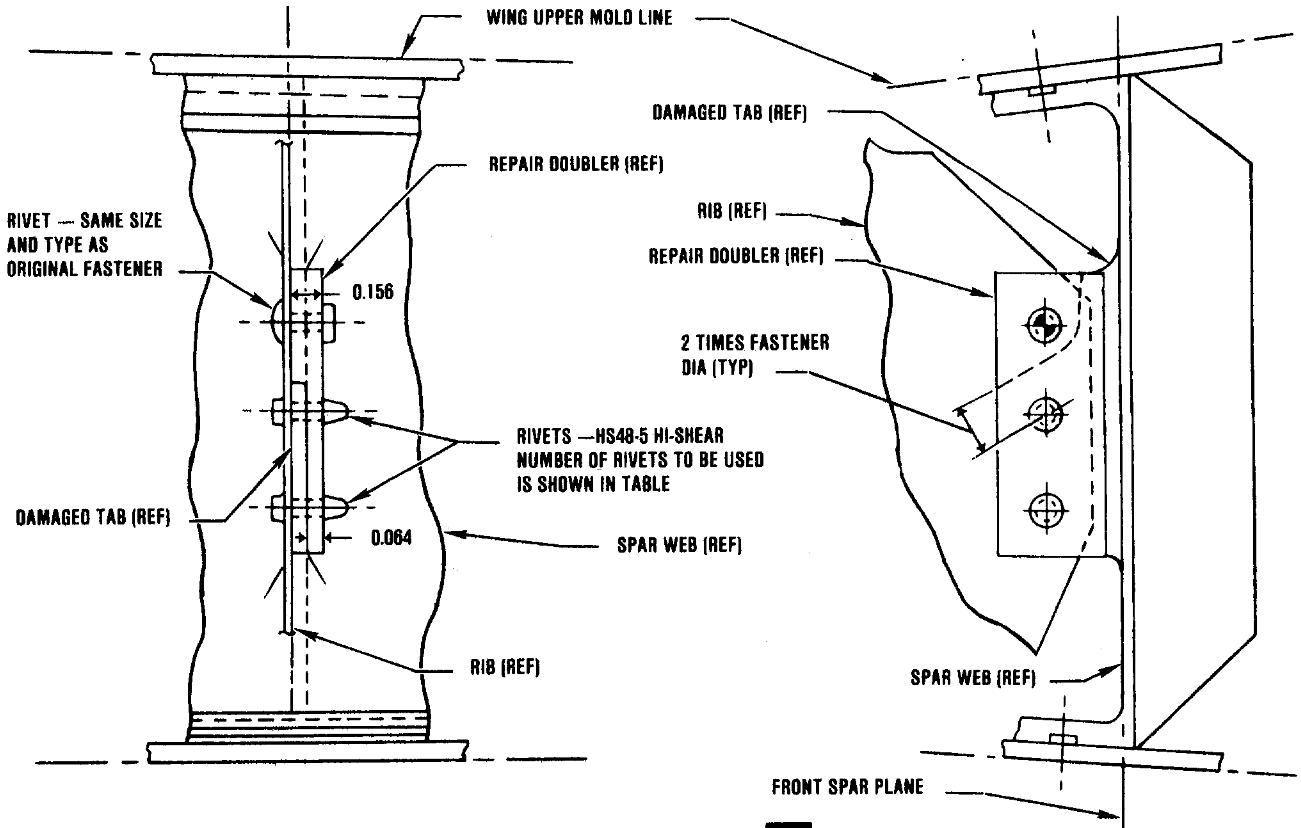
3 Seal repair faying surfaces and jo-bolts as described in 57-10-30.

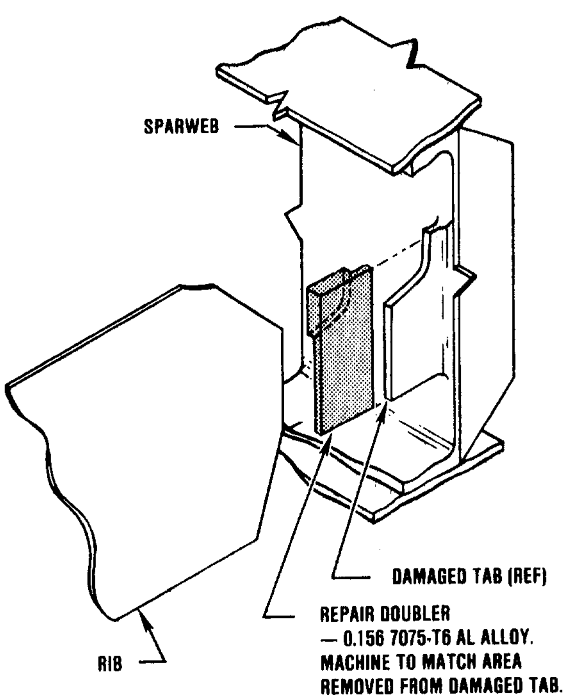
NOTE

THIS REPAIR IS APPLICABLE TO WING LEADING EDGE RIB TABS ON FRONT SPAR. SEE CHART ON SHEET 2 FOR LEADING EDGE STATION NUMBERS.

S265-3-244

Wing Front Spar Air-load Rib Tab Repair
Figure 204 (Sheet 1 of 2)





1 Grind or file out damaged area.

2 Dye-penetrant-check damaged area to be certain all all damage has been removed.

3 Machine repair doubler to match area removed from damaged tab.

4 At a position on undamaged portion of damaged tab. fasten rib, repair doubler, and damaged tab together, using HS48-5 Hi-Shear rivets, each extending through rib, doubler, and tab.

5 Fasten rib and repair doubler together, using rivet of same type and size as original rivet.

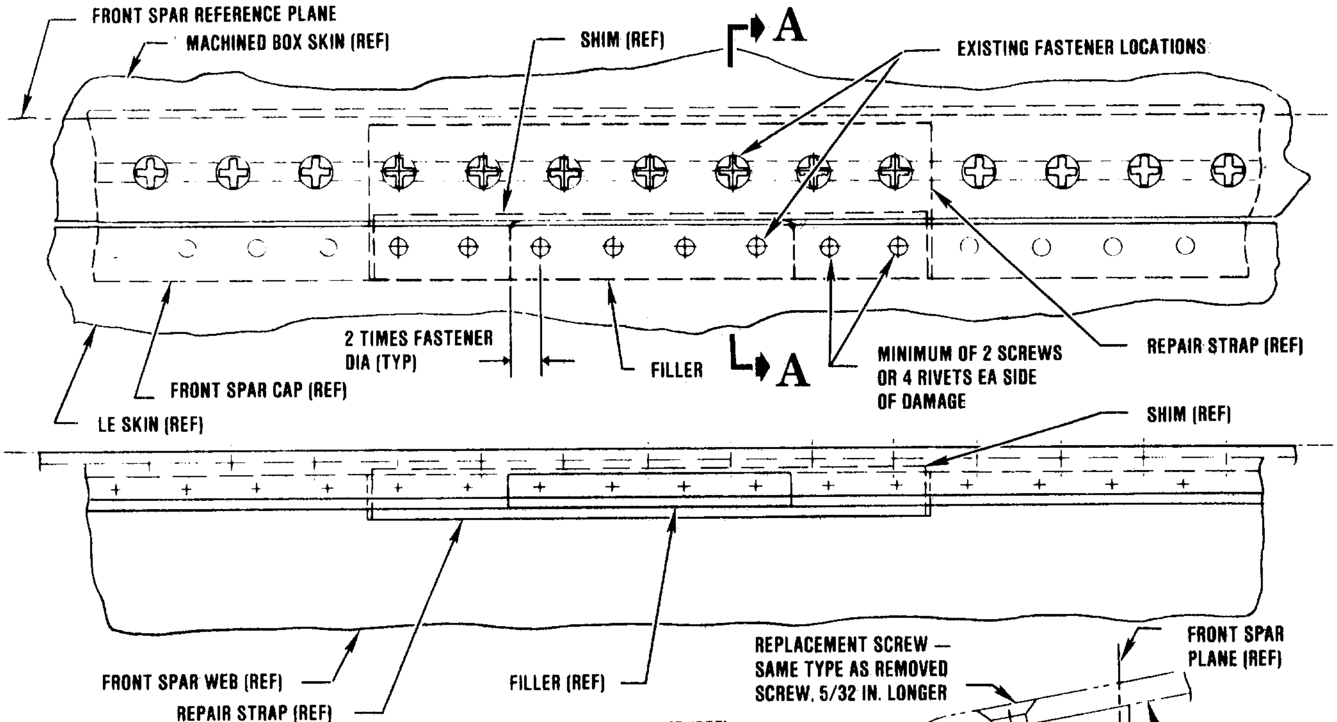
ORIGINAL NUMBER OF RIVETS	WS	MINIMUM NUMBER OF RIVETS EXTENDING THRU UNDAMAGED PORTION OF DAMAGED TAB **A**
7	93.421	5
6	113.375	4
6	137.438	4
5	160.375	3
5	183.062	3
4	202.484	3
4	224.750	3
3	244.781	2
3	263.875	2

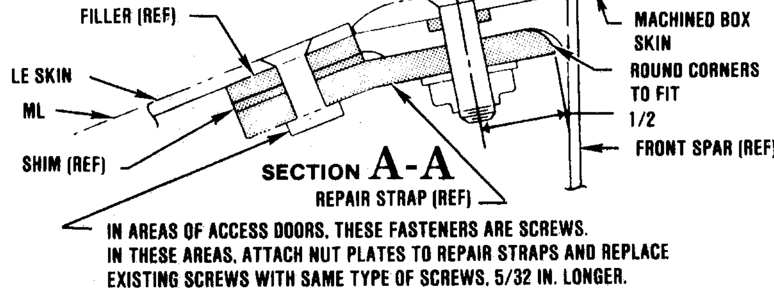
NOTE

A THIS REPAIR IS NOT BE USED IF NUMBER OF RIVETS EXTENDING THROUGH UNDAMAGED PORTION OF DAMAGED TAB IS LESS THAN THAT INDICATED.

S265-3-245

Wing Front Spar Air-load Rib Tab Repair
Figure 204 (Sheet 2 of 2)





1 Trim out damage midway between existing fasteners. Smooth and round all edges and corners.

2 Make filler from material called out, length of damage cutout in front spar cap.

3 Make repair strap from material called out. Length of repair strap is to equal length of damage plus length of areas in which either two screws or four rivets are installed on either side of damage. Make shim from 7075-T6 material, length same as length of repair strap, and gauge determined by thickness of spar in repair area.

4 Through machined box skin and front spar, remove necessary number of screws to accommodate repair strap.

5 Place repair strap in position, and mark or duplicate centers of fastener holes.

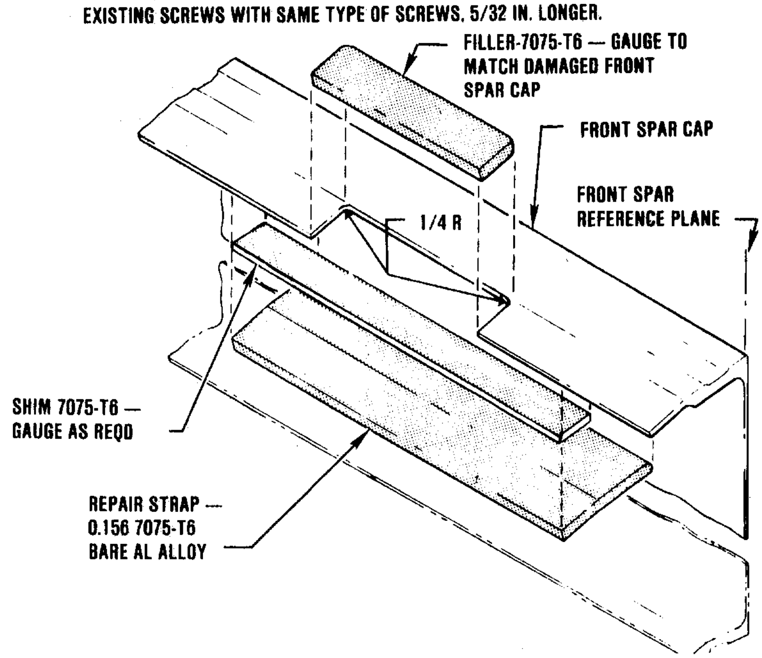
6 Remove repair strap, and drill fastener holes. Do not drill repair strap while it is in position on spar cap, because drill chips or shavings could possibly enter sealant grooves if repair strap is drilled on assembly.

7 Fasten repair parts in place, using size and types of fasteners called out.

8 Reseal machined skin in areas where screws have been removed and replaced.

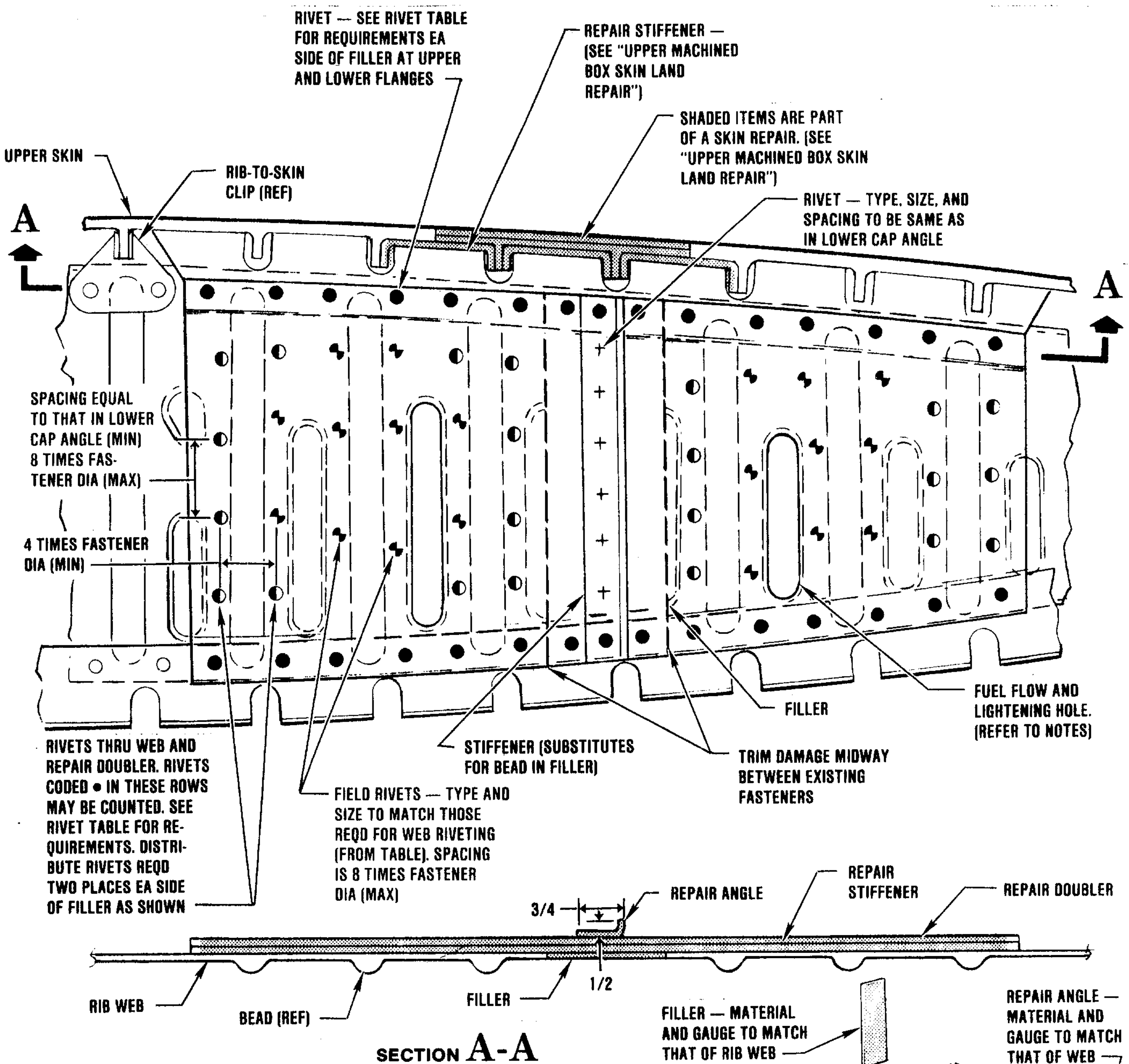
NOTE

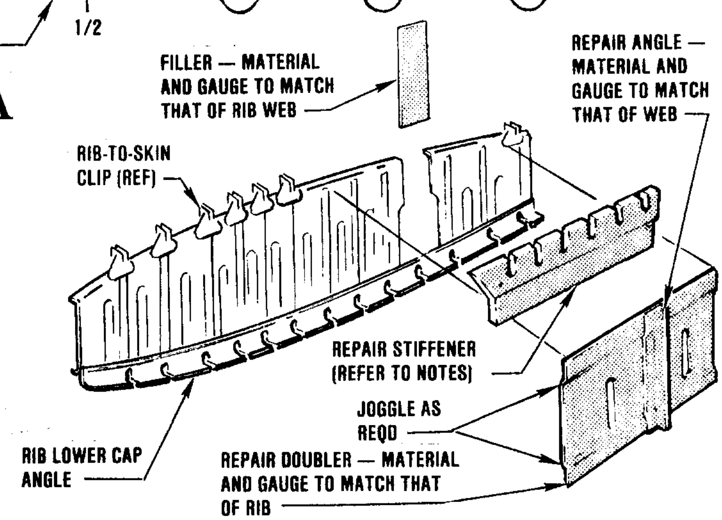
THIS REPAIR IS APPLICABLE ONLY TO AREAS OUTBD OF WS 65.



S265-3-246

Wing Front Spar Upper Cap Repair
Figure 205





NOTES

- THIS REPAIR IS APPLICABLE TO WING MAIN BOX RIBS LISTED IN RIVET TABLES (SHEET 2).
- SEE UPPER MACHINED BOX SKIN LAND REPAIR, 57-30-20, FIGURE 205 FOR MATERIAL AND FABRICATION DETAILS OF REPAIR STIFFENER.
- THIS REPAIR MAY BE USED IN CONJUNCTION WITH SKIN REPAIR SHOWN.
- DO NOT COVER MORE THAN FOUR CONSECUTIVE FUEL FLOW AND LIGHTENING HOLES.
- REFER TO SHEET 2 FOR STEPS AND RIVET TABLES.

S265-3-248

Box Section Rib Repair
Figure 206 (Sheet 1 of 2)

1 Trim out damaged portion or rib web.

2 Fabricate repair parts.

3 Heat-treat parts formed from annealed materials to applicable "T" condition.

4 Remove rib-to-skin clips as necessary to accommodate repair parts.

5 Prime all repair parts with Cati-Coat primer.

6 Assemble repair parts.

7 Touch up all unpainted areas with Cati-Coat primer.

RIVET TABLE FOR 265-130023 STRUCTURE ASSEMBLIES				
WS	CHORDWISE (AT UPPER AND LOWER FLANGES)		VERTICALLY (THRU WEB AND REPAIR DOUBLER)	
	RIVET — MS20470 **A**	NO. REQD EACH SIDE OF REPAIR	RIVET — MS20470 **A**	NO. REQD PER IN. OF WEB **B**
12.322 (C) **C**	AD5	6	AD5	2.862
24.644 (C) **C**	AD5	6	AD5	2.862
47.89 (C) **C**	AD5	6	AD5	2.862
65.81	AD5	6	AD5	2.862
79.07	AD5	6	AD5	2.862
92.23	HS46	5	HS46	2.106
105.99	HS46	5	HS46	2.234
119.85	AD5	6	AD5	2.641
133.91	AD5	6	AD5	2.641
146.48	AD5	6	AD5	2.641
159.08	AD5	6	AD5	2.641
171.62	AD5	8	AD5	3.699
185.05	AD5	6	AD5	2.641
198.35	AD5	6	AD5	2.641
211.75	AD5	6	AD5	2.641
225.75	AD5	6	AD5	2.641
239.85	AD5	6	AD5	2.641
254.35	AD5	8	AD5	2.862
268.85	AD5	8	AD5	2.862
281.85	AD5	8	AD5	2.862

NOTES

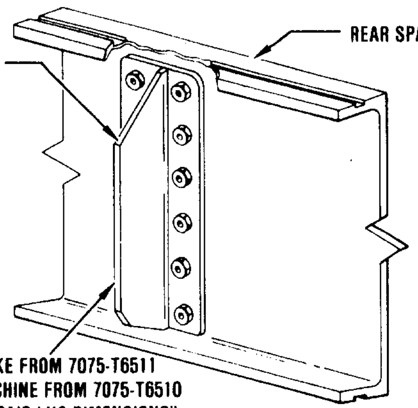
A EXCEPT FOR HI-SHEAR (HS SERIES) RIVETS LISTED.

B AT EACH PLACE NOTED ON REPAIR.

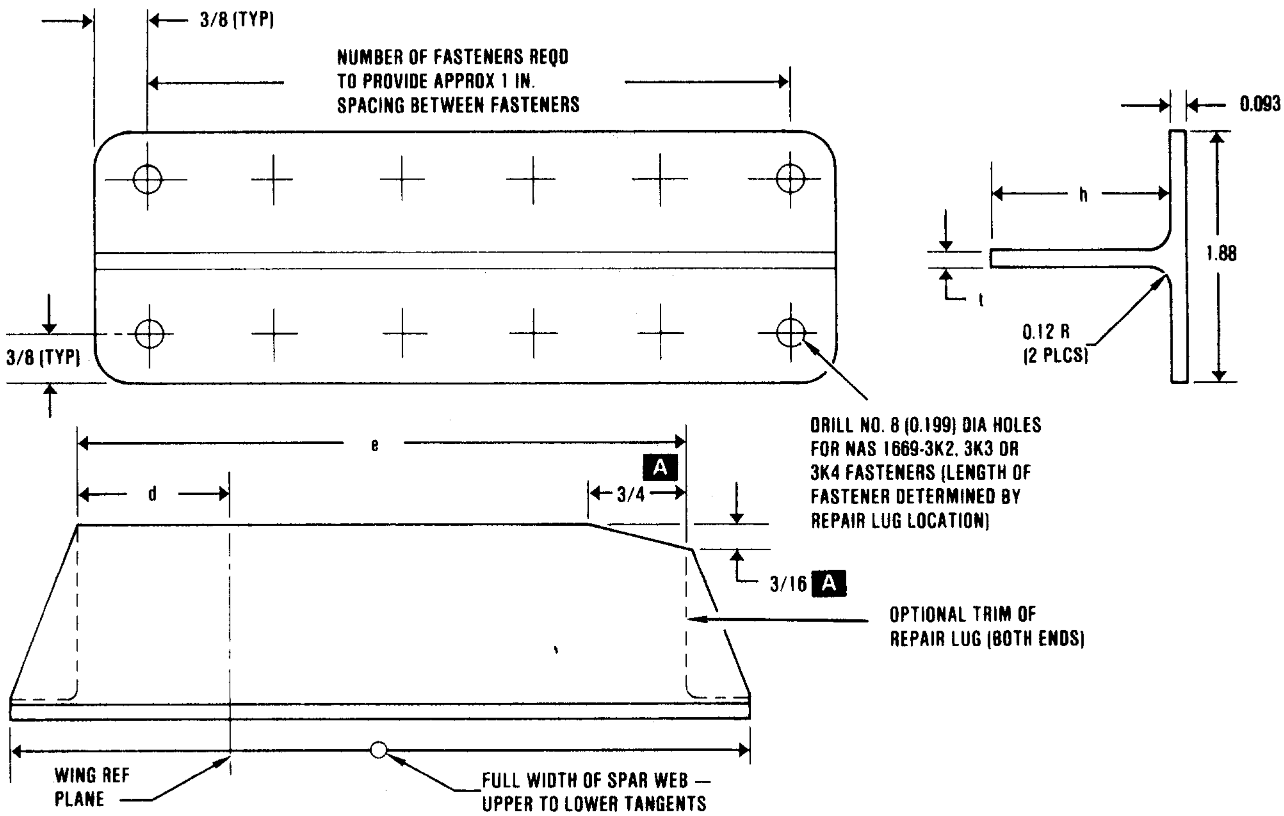
C CANTED

S265-3-249

Box Section Rib Repair
Figure 206 (Sheet 2 of 2)



REPAIR LUG DIMENSIONS				
RSS	e	d	h	t
63.345	4.69	1.19	1.38	0.125
75.302	4.12	1.12	0.94	0.093
94.758	2.06	0.12 +0.06	1.03	0.093
113.758	2.06	0.22 +0.06	0.88	0.093
127.758	2.06	0.28 +0.06	0.88	0.093
152.450	2.06	0.41 +0.06	0.88	0.093



1 Trim off damaged lug(s) flush with rear spar web $\left(\begin{matrix}+0.000 \\ -0.005\end{matrix}\right)$

2 Dye-penetrant inspect rear spar for cracks.

3 Manufacture repair lug(s) from either 7075-T6511 extrusion or from 7075-T6510 bar or plate. Refer to "REPAIR LUG DIMENSION" chart to determine dimensions of required repair lug.

4 Locate and drill fastener holes (number as required) in repair lug.

5 Chemical film treat repair lug and bare surfaces of rear spar using Alodine 1200 for equivalent)

6 Prime repair lug and rear spar areas using zinc-chromate primer

7 Place repair lug in position on rear spar and drill fastener holes in rear spar web using holes in repair lug for a guide. Use sealing compound on drill bit to prevent chips from entering into fuel cell.

8 Coat faying surfaces of repair lug and rear spar web with sealing compound (Products Research PR1422 or equivalent)

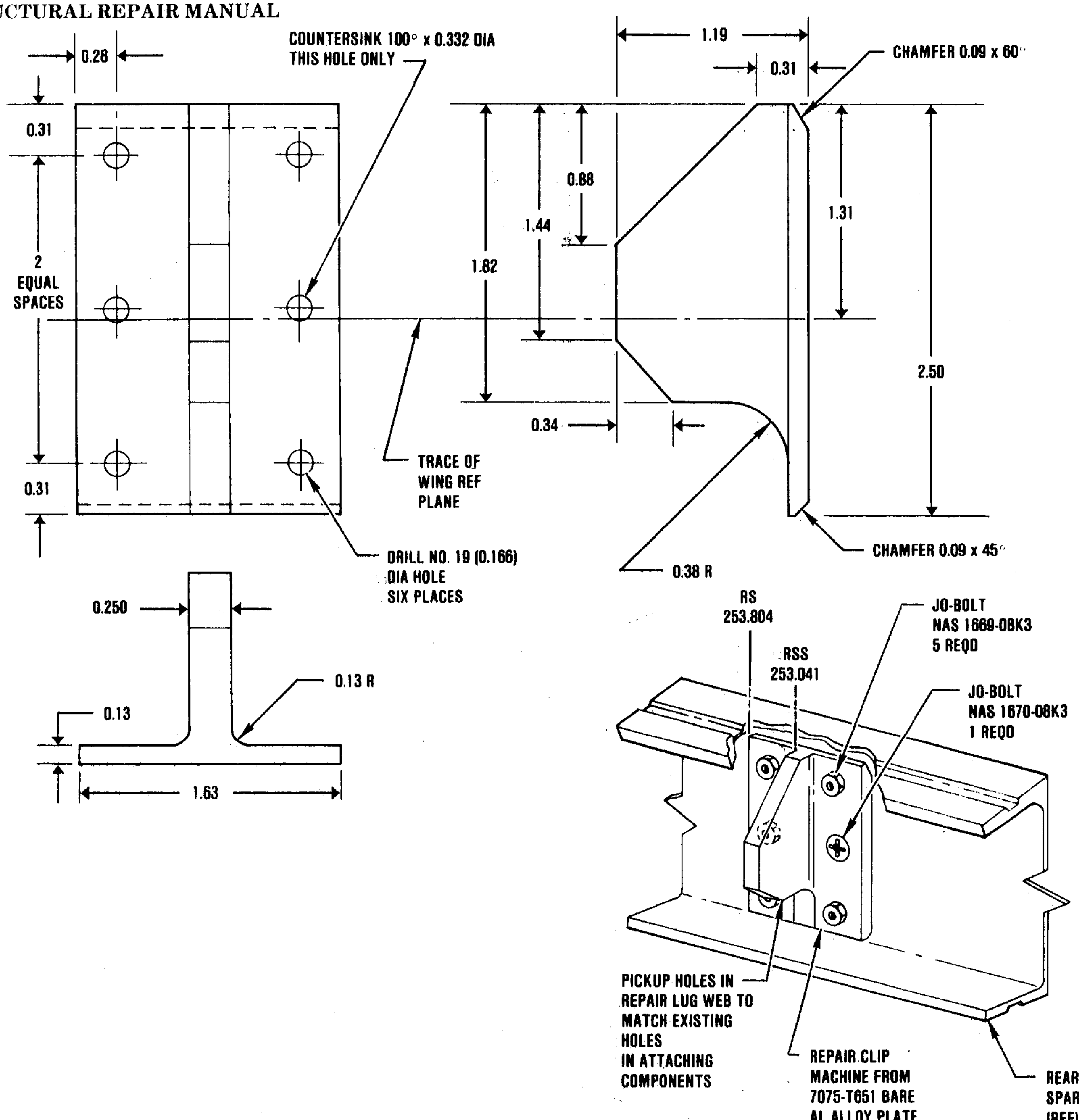
9 Secure repair lug in position on rear spar using Jo-Bolts installed as indicated in 51-40-30

NOTE

A APPLICABLE TO REPAIR LUG AT RSS 75.302 ONLY.

S265-3-333B

Repair of Rear Spar Lug at Rear Spar Stations (RSS) 63.345, 75.302, 94.758, 127.758, and 152.450
Figure 207



1 Grind off damaged lug flush with spar web (+0.000) (+0.005)

2 Dye-penetrant inspect spar for cracks.

3 Machine repair lug from 7075-T651 to dimensions shown.

4 Locate and drill No. 19 (0.166 dia) holes six places in repair lug. countersink one hole 100° x 0.332 x 0.069 deep as shown on illustration.

5 Chemical film treat repair lug and bare surfaces of rear spar web using Alodine 1200 (or equivalent).

6 Prime repair lug and rear spar with zinc-chromate primer.

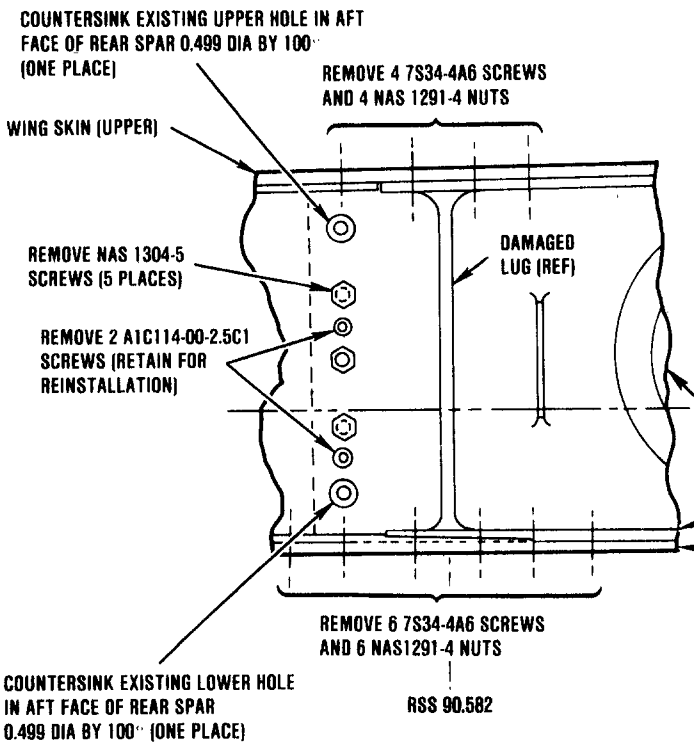
7 Place repair lug in position on rear spar and drill fastener holes in rear spar web using repair lug as a guide. Use sealing compound on drill bit to prevent chips from entering fuel cell.

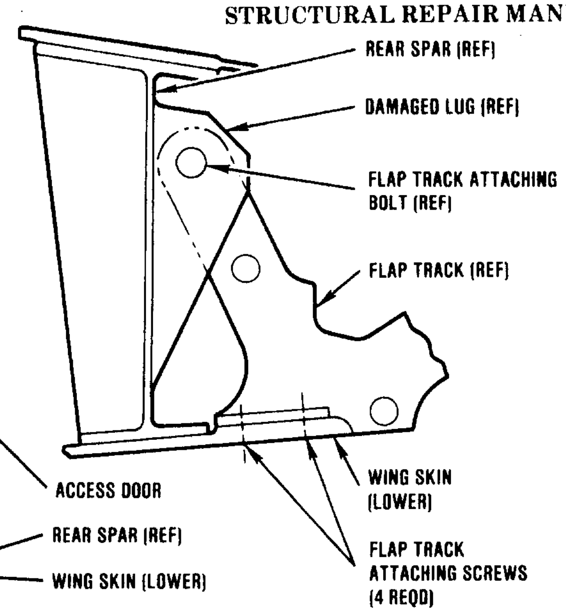
8 Remove repair lug from rear spar and coat faying surfaces of repair lug and rear spar web with sealing compound (Products Research PR1422 or equivalent).

9 Secure repair lug in place on rear spar using Jo-Bolts installed as indicated in 51-40-30, figure 2.

S265-3-332A

Repair of Rear Spar Lug at Rear Spar Station (RSS) 253.041
Figure 208





1 Remove flap adjacent to damaged area.

2 Remove fasteners securing flap track to lower skin. Check for gaps between flap track and lower skin. Any gaps exceeding 0.010 must be shimmed using 2024-T3 or 7075-T6 aluminum alloy. Taper shims as required, and prime all bare surfaces.

3 Reinstall four flap track attaching screws through lower wing skin and flap track.

4 Remove bolt attaching flap track to lug on rear spar. If boltholes through flap track and lug on rear spar are not perfectly in line, revise shim between flap track and lower skin.

5 Remove flap track. Locate and record exact location of 0.500 in. dia hole in lug on rear spar. Measure horizontally to rear spar web and vertically to a fixed point on upper flange of rear spar.

6 Grind off lug on rear spar at RSS 90.582 flush with aft surface of rear spar web to produce a smooth finish. Prime all surfaces.

7 Remove upper and lower NAS 1304-5 bolts through vertical web of rear spar splice joint. Countersink rear spar web, and install 7S34-4A5 screws in place of removed bolts. Remove remaining NAS 1304-5 bolts, sealant injection screws, and access door.

8 Manufacture fitting, spacer, and shim using details and dimensions shown on sheet 3.

9 Place fitting in position on rear spar. Install flap track with clevis of flap track over lug of fitting. Push fitting against vertical web and upper flange of rear spar. All gaps exceeding 0.005 in. between fitting and rear spar must be removed by blending surface of fitting to match surfaces of rear spar. Prime all bare surfaces with epoxy polyamide primer.

10 Clamp fitting in position, and drill and countersink, as required; temporarily install fasteners shown on sheet 2.

11 Remove flap track, and install spacer between fitting and rear spar lower flange. Gaps exceeding 0.005 in. must be removed. Prime all bare surfaces with epoxy polyamide primer.

12 Clamp spacer in position, and install shim between outbd end of spacer and rear spar lower flange. Gaps exceeding 0.005 in. must be removed. Prime all bare surfaces with epoxy polyamide primer.

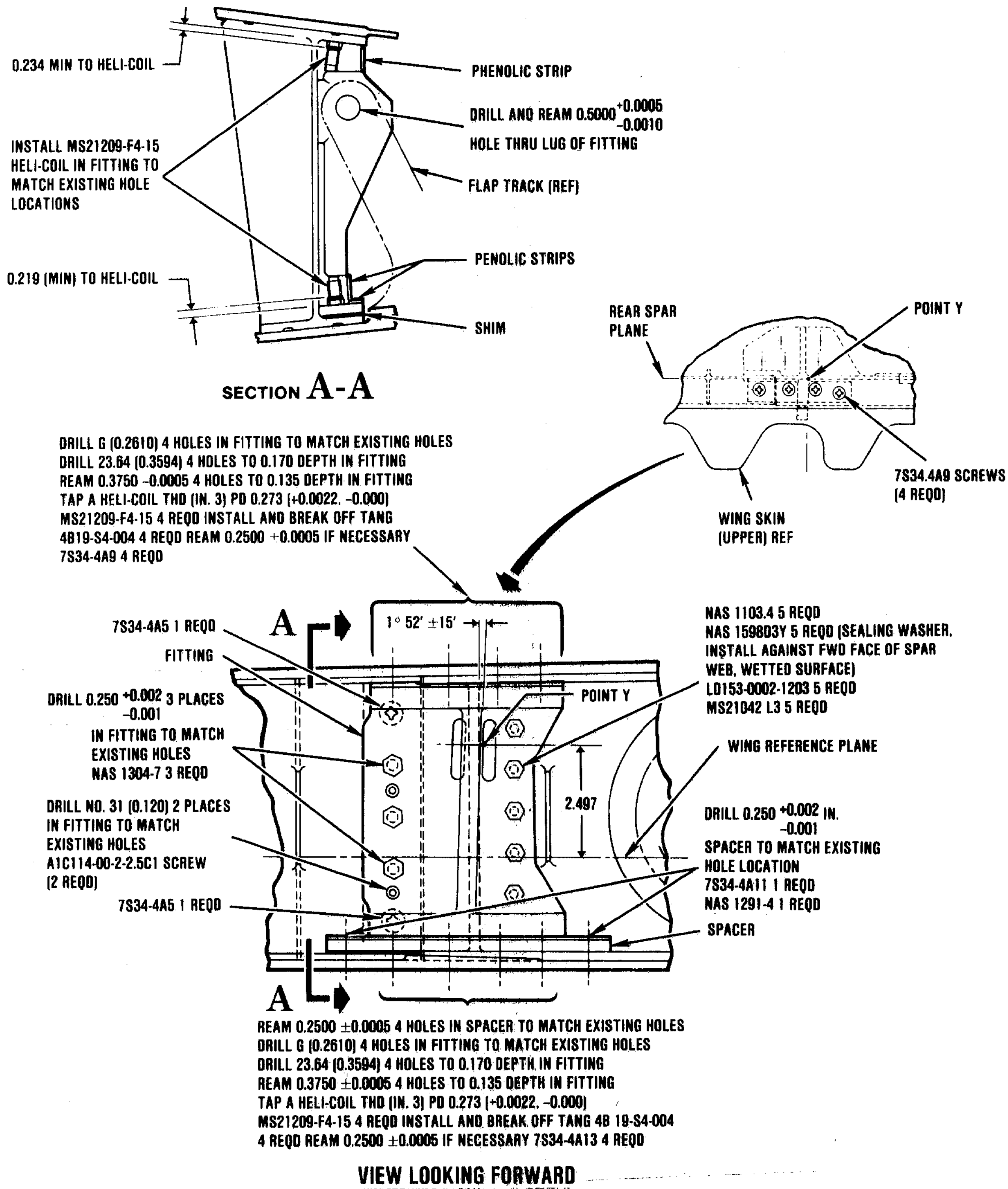
13 Temporarily install fasteners through rear spar, shim, spacer, and fitting as shown on sheet 2.

14 Locate centerline of 0.500 in. dia hole on lug of fitting using previously recorded dimensions.

15 Install flap track using four screws through rear spar lower flange. Check that centerline of 0.500 in. dia hole location lines up with hole in flap track. If hole and centerline do not match, shim flap track.

S370-3-68B

Repair Rear Spar Lug at Rear Spar Station (RSS) 90.582
Figure 209 (Sheet 1 of 3)



16 Step drill and ream 0.500 in. dia hole in lug of fitting using flap track clevis hole as guide.

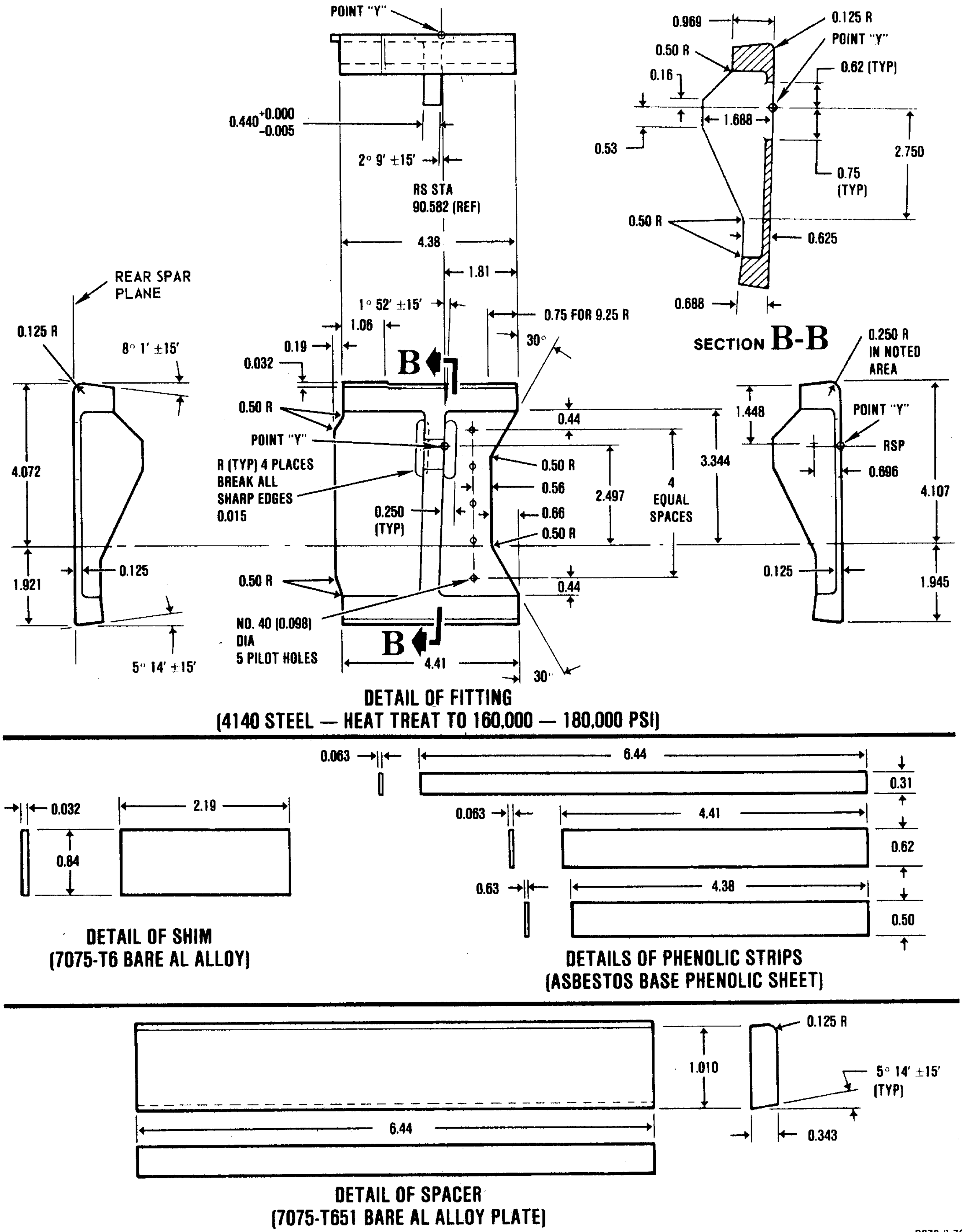
17 Remove flap track and all repair parts from rear spar. Apply sealant to all faying surfaces. Reinstall all repair parts using size and type of fasteners indicated.

18 Cement phenolic strips in place using sealant.

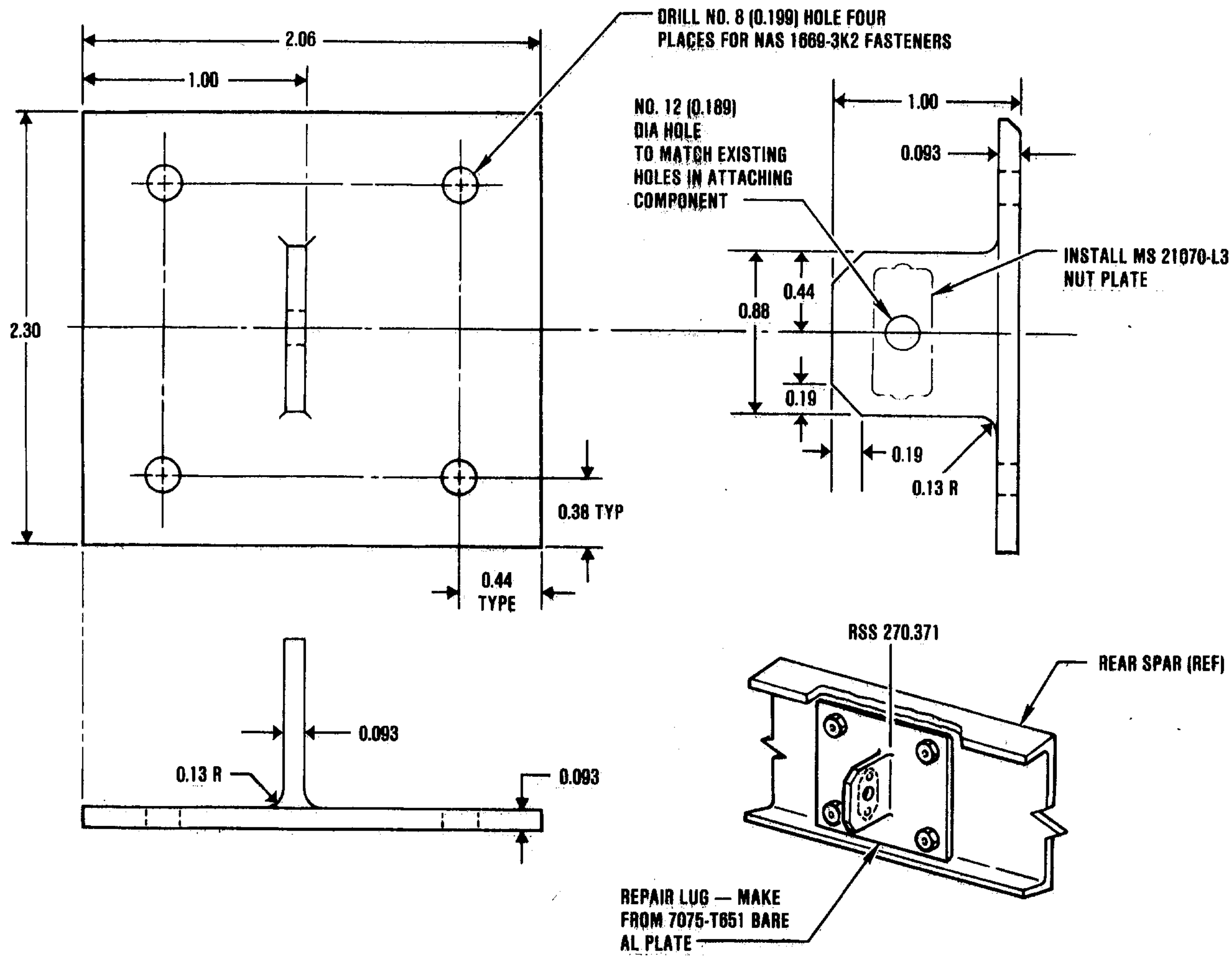
19 Reinstall flap track and flap. Adjust as necessary.

S370-3-69

Repair of Rear Spar Lug at Rear Spar Station (RSS) 90.582
Figure 209 (Sheet 2 of 3)



Repair Rear Spar Lug at Rear Spar Station (RSS) 90.582
Figure 209 (Sheet 3 of 3)



1 Grind off damaged lug flush with spar web $\left(\begin{matrix}+0.000\\-0.005\end{matrix}\right)$.

2 Dye-penetrant inspect spar web for cracks.

3 Machine repair lug from 7075-T651 to dimensions shown.

4 Locate and drill fastener holes [four No. 8 (0.199) holes and one No. 12 (0.189) hole] in repair lug.

5 Chemical film treat repair lug and bare surfaces of rear spar using Alodine 1200 or equivalent.

6 Finish tee with epoxy polyamide primer.

7 Place repair lug in position on rear spar and drill fastener holes in rear spar web using repair lug as a guide. Use sealing compound on drill bit to prevent chips from entering fuel cell.

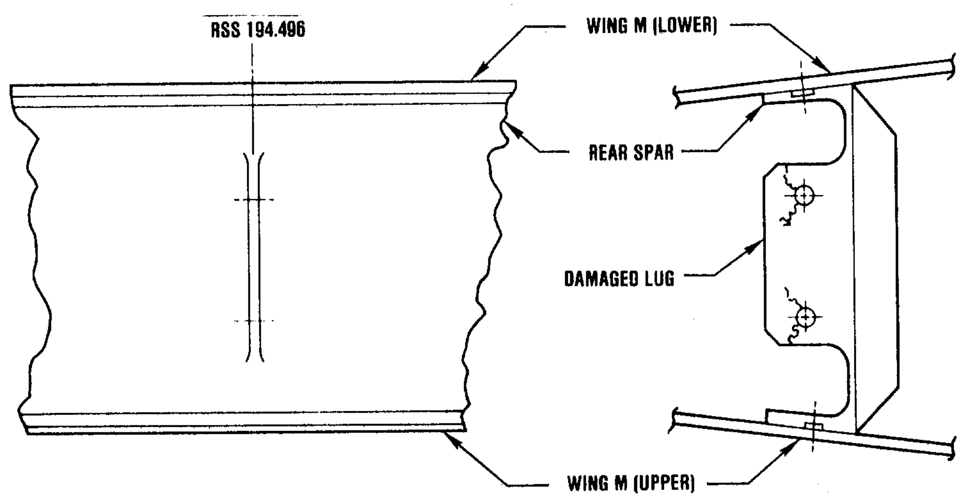
8 Remove repair lug from rear spar and attach nutplate on aft leg as indicated.

9 Coat faying surfaces of repair lug and rear spar with sealing compound (Products Research PR1422 or equivalent).

10 Secure repair lug in position on rear spar using Jo-Bolts installed as indicated in 51-40-30, figure 2.

8265-3-331B

Repair of Rear Spar Lug at Rear Spar Station (RSS) 270.371
Figure 210



1 Drain all fuel from wing. Refer to applicable Maintenance Manual. Observe all safety precautions regarding working around fuel tanks.

2 Remove aileron and gain access to damaged area.

3 Grind off damaged tab flush with surface $\begin{pmatrix} +0.000 \\ -0.005 \end{pmatrix}$.

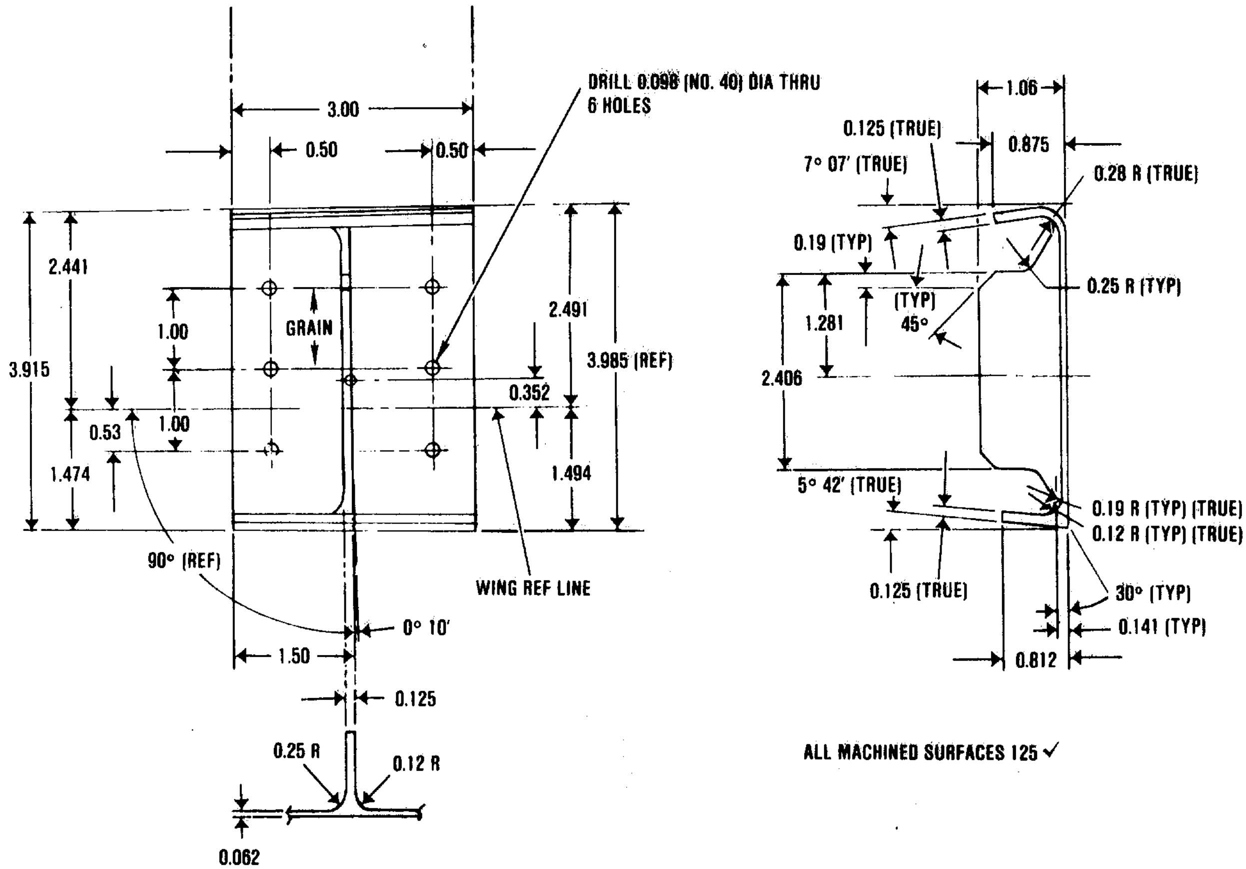
4 Dye penetrant inspect spar web, in damaged area for cracks.

5 Chemical film treat bare areas of rear spar, then apply zinc chromate or epoxy polyamide primer to treated areas.

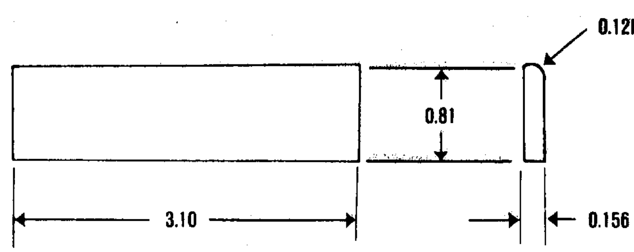
6 Fabricate repair fitting and repair shim using materials and dimensions called out on sheet 2.

S265-3-365

Repair of Rear Spar Lug at Rear Spar Station (RSS) 194.496
Figure 211 (Sheet 1 of 4)



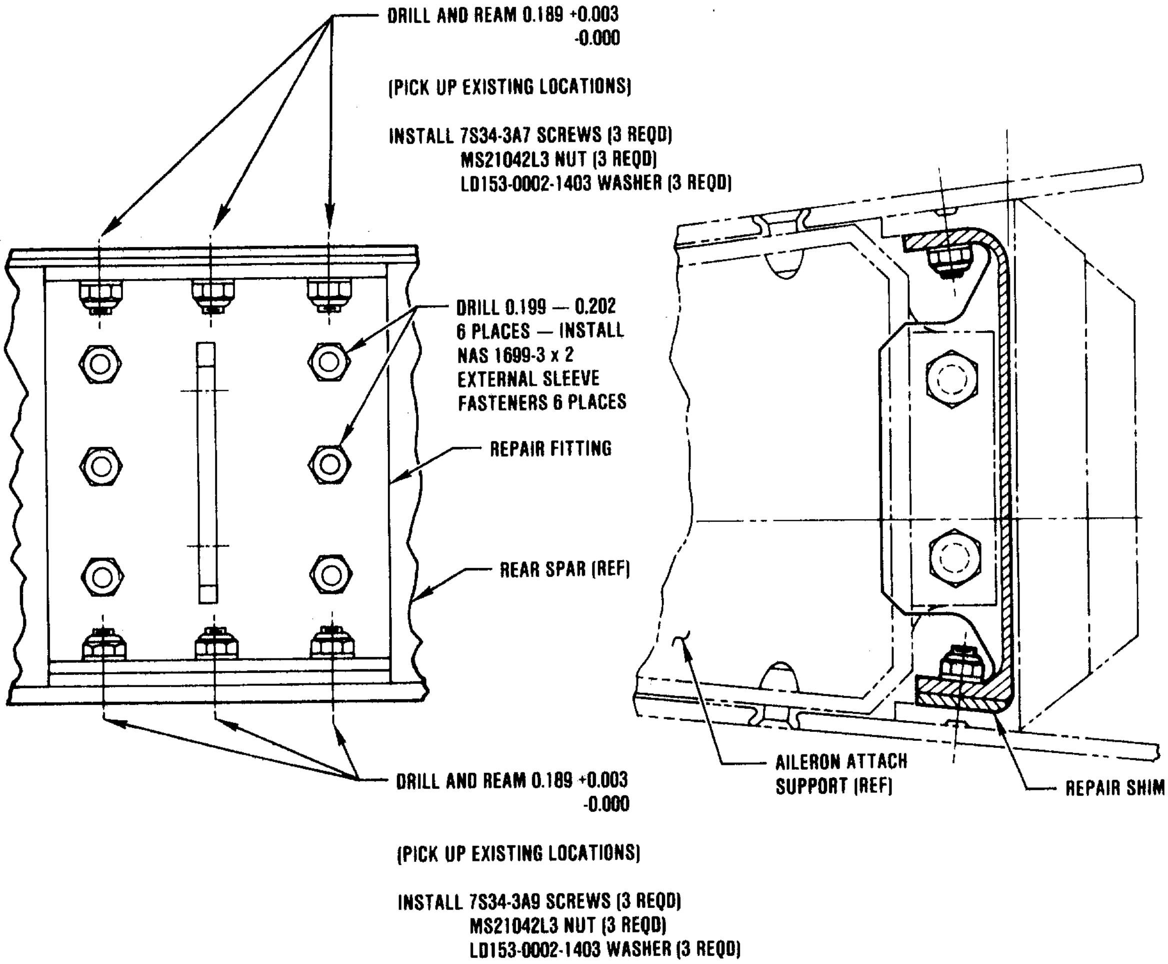
REPAIR FITTING — MAKE FROM 7075-T651 BARE AL ALLOY PLATE



REPAIR SHIM — MAKE FROM 2024-T42 BARE AL ALLOY SHEET

S265-3-366

Repair of Rear Spar Lug at Rear Spar Station (RSS) 194.496
Figure 211 (Sheet 2 of 4)



7 Layout and drill pilot holes through web of repair fitting.

8 Clamp repair fitting in place on rear spar. Clamp on upper flange only.

9 Machine repair shim so that when installed, the clearance between the repair fitting and repair shim does not exceed 0.002 in.

NOTE

TO PREVENT METAL CHIPS FROM ENTERING FUEL CELL, COAT DRILL BIT WITH SEALING COMPOUND. EVERY PRECAUTION SHOULD BE TAKEN TO PREVENT CONTAMINATION OF FUEL CELLS.

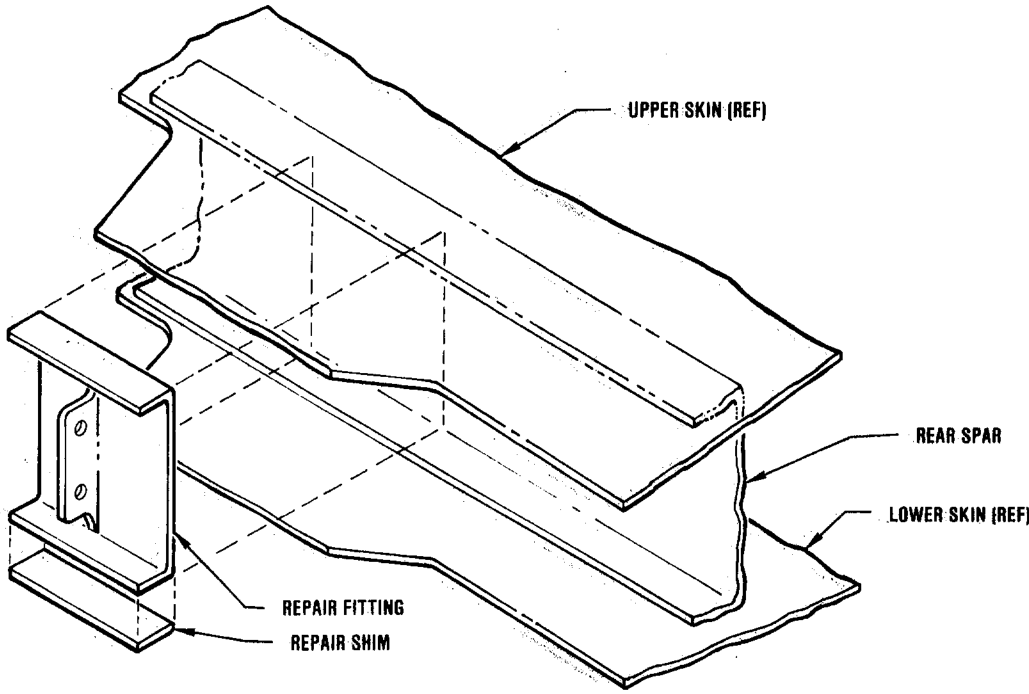
10 Install repair shim and clamp repair fitting and repair shim to rear spar.

11 Pickup fastener locations through repair fitting and rear spar web.

12 Pickup existing fastener locations through upper and lower flange of repair fitting.

S265-3-367

Repair of Rear Spar Lug at Rear Spar Station (RSS) 194.496
Figure 211 (Sheet 3 of 4)



13 Remove repair fitting and repair shim. Remove burrs from all drilled holes in repair fitting, shim, and rear spar.

14 Chemical film treat repair shim. Apply zinc chromate or epoxy polyamide primer to repair parts.

15 Apply thin coating of PR-1442 sealing compound (or equivalent) to faying surfaces of repair fitting, repair shim and rear spar.

16 Position repair fitting and repair shim in place. Install fasteners through repair fitting and rear spar web as shown in 51-40-30, figure 2.

17 Install fasteners through upper and lower flanges of repair fitting and rear spar.

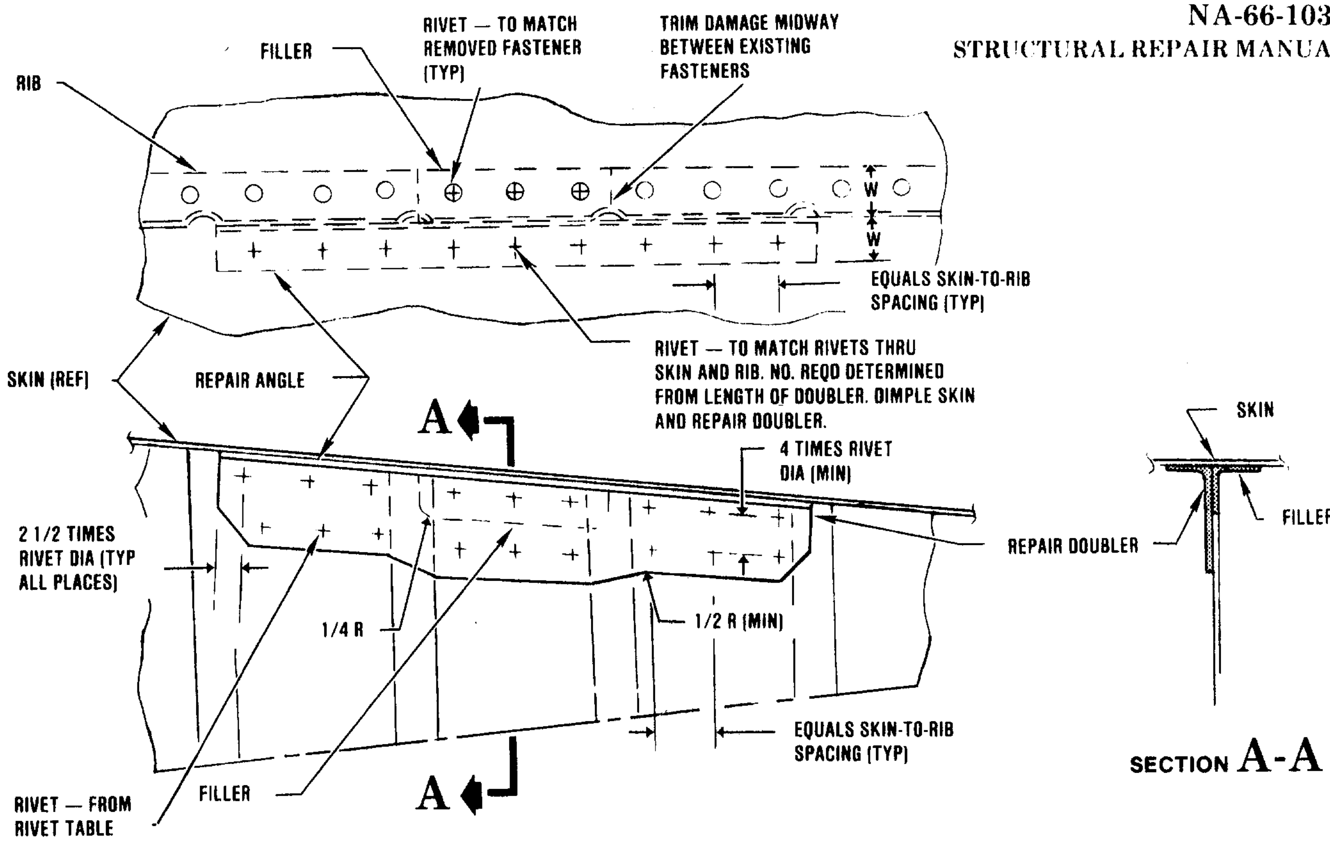
18 Secure aileron attaching support in place. Drill and ream two holes ($0.250^{+0.002}_{-0.000}$) through tab on repair fitting using holes in aileron attaching fitting as guide.

19 Secure aileron attaching support to repair fitting using 2 NAS 1104-4 bolts, 2 MS21042L4 nuts and 2 LD153-0002-1404 washers.

20 Reinstall aileron and any other removed parts or components.

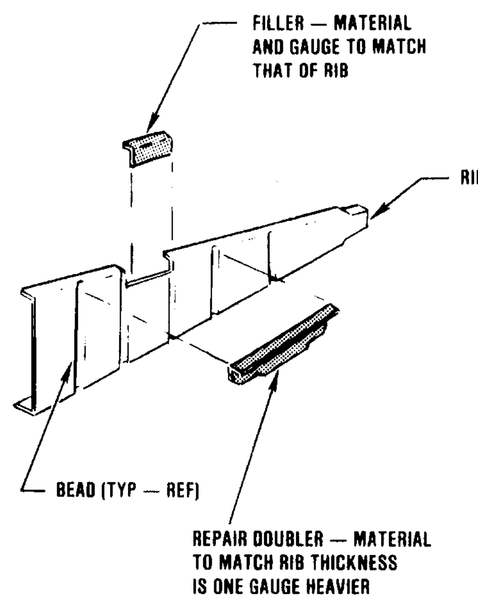
S265-3-368

Repair of Rear Spar Lug at Rear Spar Station (RSS) 194.496
Figure 211 (Sheet 4 of 4)



RIVET TABLE

WING TES	RIVET — MS20470	NO. REQD IN WEB EA SIDE OF DAMAGE
30.079	DD6	6
33.884	AD5	6
38.595	AD5	6
43.286	AD5	6
47.997	AD5	6
49.616	AD5	6
51.284	AD5	7



1 Raise or remove skin.

2 Trim out damage.

3 Fabricate repair parts.

4 Install repair parts.

5 Reinstall skin. CR2248 rivets may be used for skin trailing edge close-out.

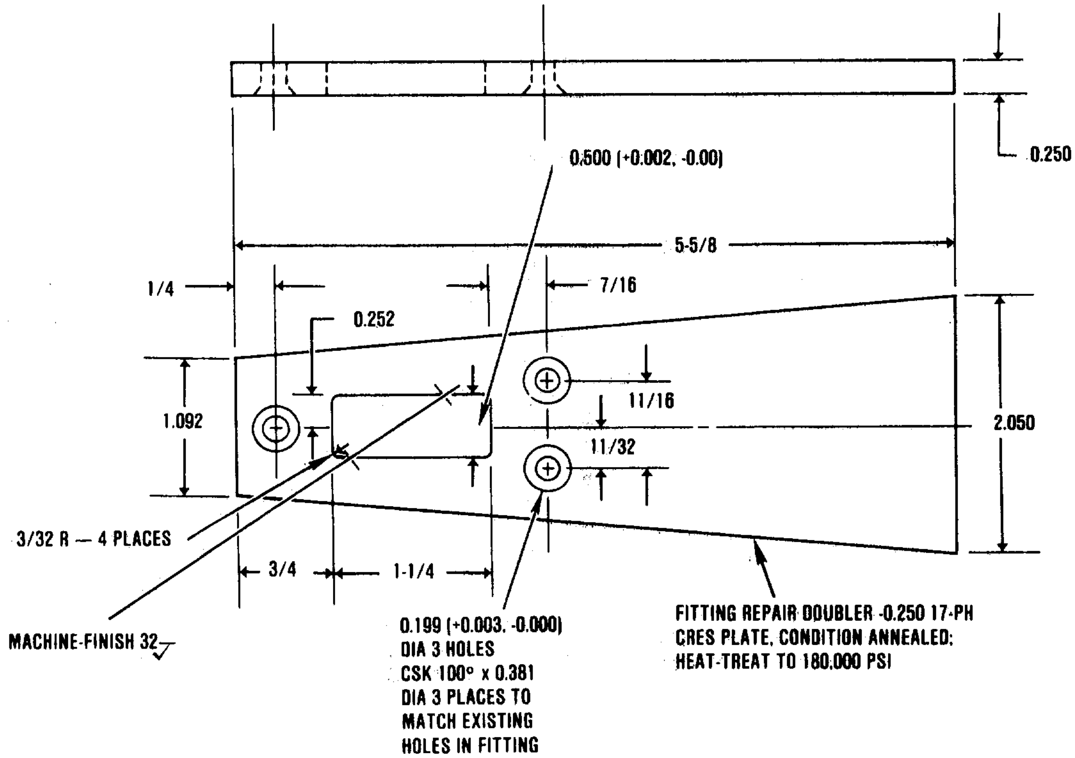
6 Refinish repaired surface to match surrounding area.

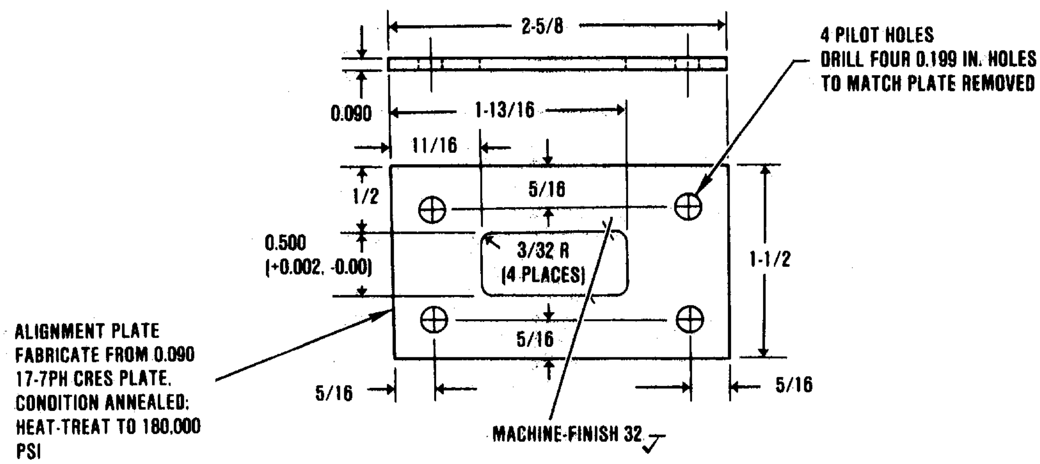
NOTES

- THIS REPAIR IS APPLICABLE TO WING RIBS AS INDICATED IN RIVET TABLE.
- NEST REPAIR DOUBLER INSIDE OF RIB FLANGE ON RIBS WHICH DO NOT INCORPORATE BEADED WEBS.

S265-3-254

Wing Inbd Trailing Edge (TE) Rib Repair
Figure 212





1 Remove flap (Refer to applicable maintenance manual.)

2 Remove wing inbd trailing edge panel assembly

3 Fabricate repair doubler and replacement part to dimensions shown.

4 Heat-treat repair doubler and replacement part to 180,000 psi.

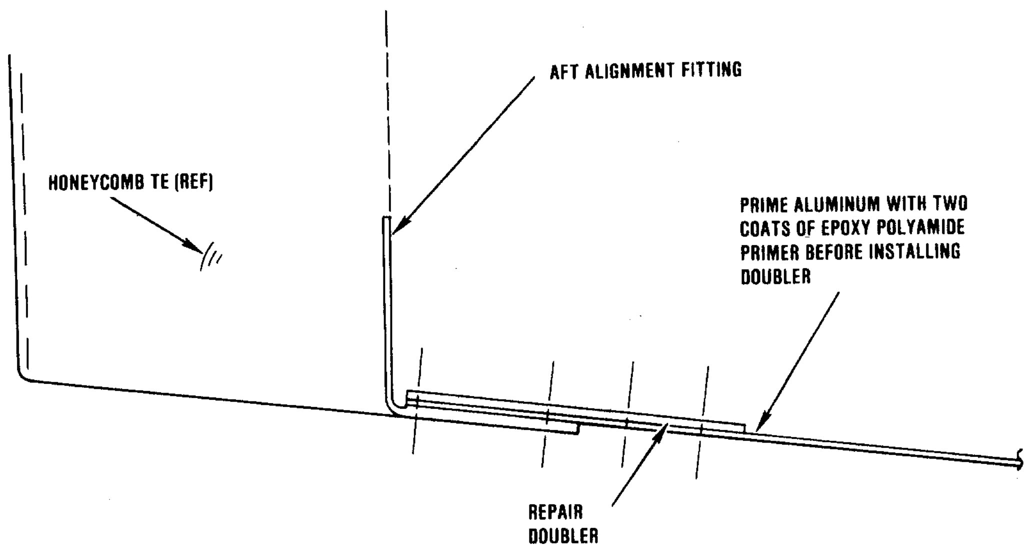
5 Prime repair doubler and replacement fitting with epoxy polyamide primer.

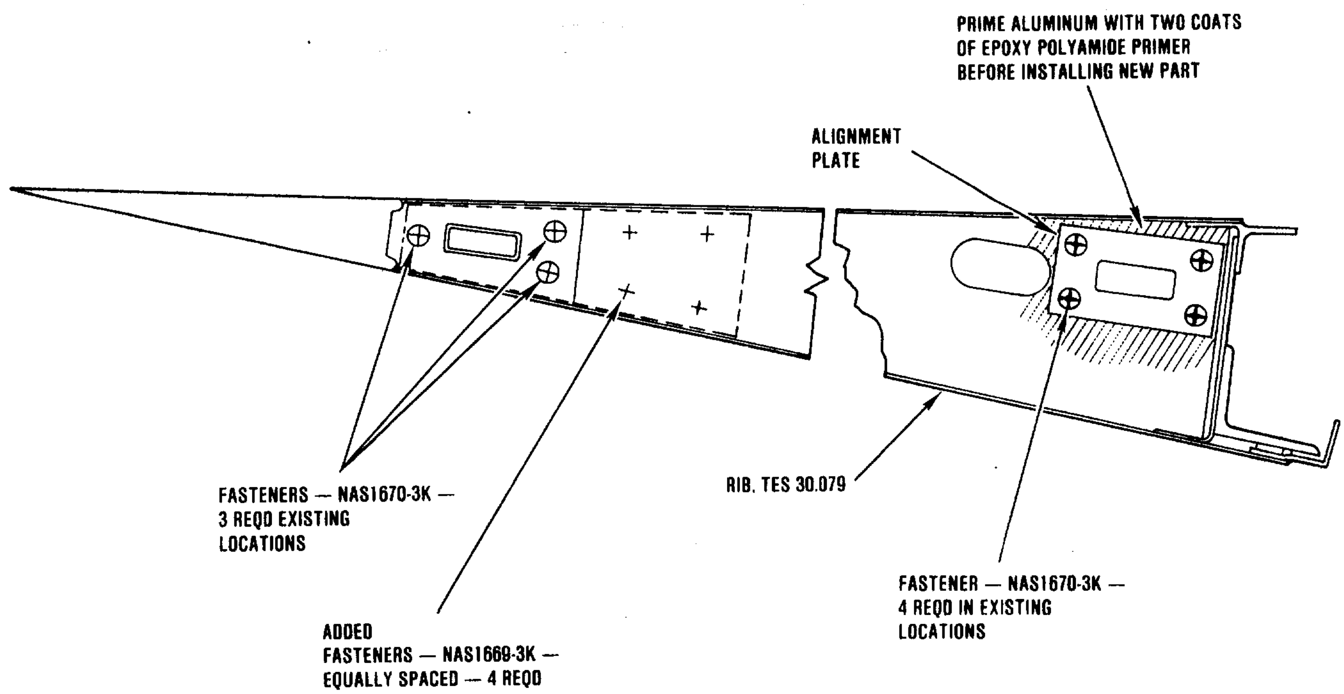
NOTE

BOTH ALIGNMENT FITTINGS SHOULD BE REPAIRED/ REPLACED AT THE SAME TIME

S370-3-72A

Repair of Wing Inbd Trailing Edge (TE) Alignment Fitting
Figure 213 (Sheet 1 of 2)





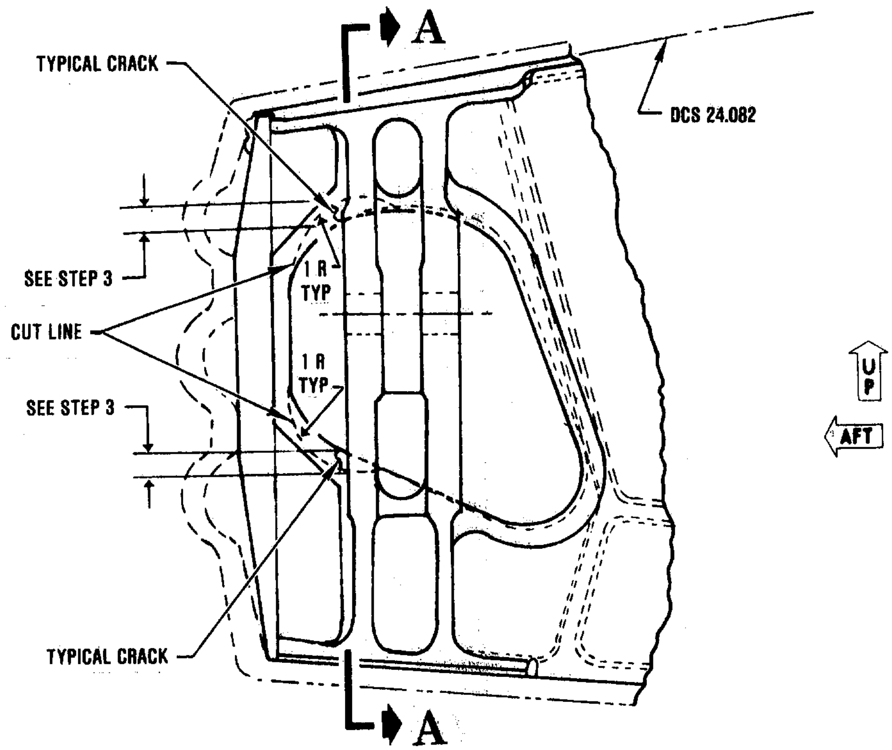
6 Install repair parts and prime fasteners.

7 Install inbd trailing edge panel assembly.

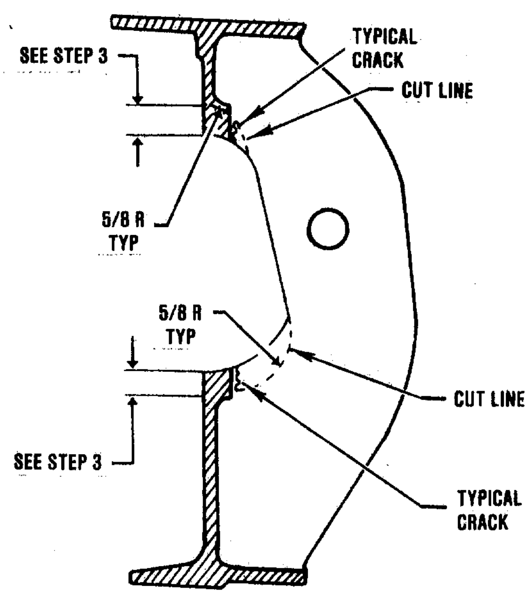
8 Install flap. (Refer to applicable maintenance manual.)

S370-3-73A

Repair of Wing Inbd Trailing Edge (TE) Alignment Fitting
Figure 213 (Sheet 2 of 2)



RIB ASSY (LOOKING OUTBD)
285-130258-11 LH SHOWN
285-130258-12 RH OPPOSITE



SECTION A-A

1 Remove cracks by hand blending.

2 Maintain existing radii as the minimum radii.

3 Remove no more than 0.375 in. of material in the vertical direction.

4 Dye penetrant inspect blended area to be certain of complete removal of all cracks.

5 The finish after rework should be 63 RMS max.

6 Finish with epoxy polyamide primer.

NOTES

- THIS REPAIR IS APPLICABLE TO WING TRAILING EDGE DCTES 24.082).
- REMOVE MATERIAL ONLY IN THE VERTICAL DIRECTION IN THE RADIUS AT THE INTERSECTION OF LUGS AND VERTICAL RIB WEB.

S265-3-364

Wing Trailing Edge (TE) Rib Repair — Station 24.082
Figure 214

WING TANK SEALING

REPAIRS

GENERAL

The wing fuel tank structural joints are, for the most part, sealed by two methods. Where a faying surface seal is required, the groove injection method is used. Where the sealing requirements involve the fastener only, the sealing is accomplished with an O-ring. In a few internal joints, a hardening type of sealant is used. The type of seal, or sealant, used for each structural joint and fittings is shown in figure 201. Examples of the sealing methods are shown in figure 202.

Sealing of the wing fuel tank doors and fittings is accomplished by "O" rings. The O-rings are either bonded to grooves in the faying surface of the part, or they are bonded to either side of a separate seal assembly that serves as a sealing washer between the parts. Rubber/metal washer assemblies (Stat-O-Seal or Duo-Seal washers) are used to seal each attach fastener. (See figures 201 and 202.)

The groove seal method used for fastener and faying surface sealing consists of a machined groove in the faying surface of the under or second member that is continuous along the fastener row. Continuity of the groove around each fastener is achieved by spot-facing the holes to the depth of the groove. Small countersunk holes through the outer or first member, at approximately 3 in. spacing, are provided for sealant injection. Sealant injection holes are in line with, and midway between, structural fasteners. Flush self-tapping screws are used to plug the injection holes when the sealing has been accomplished. (See figures 201 and 202.)

Individually (O-ring) sealed fastener installations involve flush-head fasteners only. The O-ring is formed by a shallow counterbore in the base of the countersink. On installation, the ring is compressed by the screwhead against the sides and bottom of the counterbored receptacle, forming the seal. (See figures 201 and 202.)

GROOVE INJECTION SEALING

The ability of groove injection sealant to seal depends upon its adhesion to metal. Oils, greases or any other contaminates in the sealant grooves or sealant injection holes could cause a defective seal. If the sealant grooves are accessible, wipe the grooves with a clean cloth, moistened with cleaning solvent then dry the surfaces with another clean dry cloth. If the sealant grooves are not accessible, make certain that the area surrounding the sealant injection holes are clean and that when the sealant injection hole screw is removed, contaminates do not enter into the injection hole.

Materials/Equipment Required

MATERIALS	SOURCE KEY [A]
Groove Injection Sealing Compound Products Research — PR 703	002
Groove Injection Sealant Gun Grover Smith Pump Co. No. 223 (Air Operated)	052
or	
Groove Injection Sealant Gun Grover Smith Pump Co. No. 225 (Hand Operated)	052
Tip-Sealant Gun (See figure 203.)	
Cleaning Solvent	001

Loading Sealant Injection Gun

See figure 203.

Air-operated Sealing Gun

1. Remove loading chamber from gun barrel and push loading piston to its fully bottomed position.
2. Roll sealing compound into a cylindrical shape about 1-3/4 to 2 in. in dia.

NOTE

Hands must be clean and oil-free before sealing compound is handled.

3. Insert plug of sealing compound into loading chamber of gun. Tamp sealing compound with a wooden stick until all air bubbles are forced out.
4. Reassemble loading chamber to gun barrel.

Hand-operated Sealing Gun

1. Back off "T" handle until spring tension is released and handle is released and handle is fully extended.
2. Unscrew pressure head from sealant chamber.
3. Roll sealing compound into a cylindrical shape about one in. in dia.

[A] Refer to 51-30-00 for manufacturer.

REPAIRS (Continued)

Hand-operated Sealing Gun (Cont'd)

4. Insert plug of sealing compound into barrel of gun. Tamp sealing compound with a wooden stick until all air bubbles are forced out.
5. Reassembly pressure head to sealant chamber.
6. Screw "T" handle in until spring tension is felt. As sealing compound is forced out of gun by this operation, the "T" handle must be screwed in further to maintain spring tension.

Sealing Procedures

NOTE

Injection of sealant into groove-sealed areas should not be attempted when temperature of wing structure is below 4°C (40°F). Whenever possible, it is recommended that temperature of structure be at least 25°C (77°F).

1. Remove self-tapping screws from injection holes in areas to be resealed. One hole (min) each side of hole being injected must be unplugged.

NOTE

Regular injection gun tip may be used, except when injecting through wing joint splice plates. See figure 203 for details of special tip required on these areas.

2. Place nozzle tip of gun squarely in countersink. Hold gun firmly in position and depress trigger (air-operated gun) for about 30 seconds. Release trigger and allow piston to return. Continue sequence until compound flows out of adjacent injection hole for a min distance of 1/8 in. (Repair damaged injection holes as shown in figure 204.)
3. Move gun tip to one of adjoining injection holes. Hold gun firmly in place and depress trigger until sealant flows out of hole previously injected.

NOTE

When injecting sealant into tank grooves, injection holes to either side of gun tip must be unplugged. To decrease time required for injection, it is permissible to heat guns to a max of 110°F.

4. Move gun to adjacent hole and repeat operation. Continue foregoing procedure until sealant has been forced out of all injection holes in affected areas.
5. Replace all self-tapping screws in sealant injection holes. Remove extruded sealant by carefully scraping with a non-metallic scraper and wiping with cleaning solvent.

FUELTIGHT FAYING SURFACE SEALING, -65 to 200°F

The area to be sealed must be free of all foreign matter and contaminates. A vacuum cleaner, air hose, or lint-free cloth should be used to remove chips and dust from the area. Wipe all surfaces to be sealed with a clean cloth saturated with naphtha. Before naphtha has evaporated, wipe surface with a clean, dry cloth. If the naphtha is allowed to evaporate, the dissolved contaminates will remain on the surface.

NOTE

Do not use soiled cleaning cloths. When a cloth becomes contaminated, it should be discarded. Cloths used for cleaning should never be dipped into solvent. Pour solvent onto cloth to avoid contamination.

Repeat cleaning procedure until there is no further evidence of contamination on surfaces to be sealed.

Materials/Equipment Required

MATERIAL	SOURCE KEY A
Sealing Compound, Temperature Resistant Products Research PR 1422, Class B4 and PR 1422 accelerator	002
Sealing Compound — Topcoat Minnesota Mining Co. EC776 or EC776R	005
Sealant Gun Semco 250 or equivalent	043
Methyl Ethyl Ketone (MEK) (or equivalent)	001
Toluene	001

Mixing Sealing Compound

Mix the base compound and the accelerator together in the proportions recommended by the manufacturer. The two components must be thoroughly mixed to completely disperse the accelerator throughout the base compound. If the mixture is not thoroughly blended there will be

A Refer to 51-30-00 for manufacturer.

REPAIRS (Continued)

Mixing Sealing Compound (Cont'd)

areas where the cure will be incomplete. At room temperature (approx. 77°F) the blended sealant has a pot life of 3 hours, and must be discarded when the pot life has expired. The blended sealant may be stored at 0 to -10°F for a period of 72 hours providing the sealant is refrigerated immediately after blending.

Application of Sealing Compound

Apply sealant in well ventilated areas or use air supplied respirators. Use a spatula or sealant gun to apply sufficient sealant to both faying surfaces of components to be sealed. Make certain that all voids and surface irregularities are filled prior to the mating of the two faying surfaces. The faying surfaces should be joined as soon as possible after the application of the sealant. Excess sealant forced from between the faying surfaces may be removed or formed into a fillet or bead using a spatula.

When the sealant has cured, all exposed sealant shall receive two brush coats of fuel resistant top coating (EC776R) allowing about 20 minutes between each coat. Clean up sealing equipment and areas adjacent to sealed components within the pot life of the sealant (about 3 hours). Use toluene to clean painted surfaces and MEK to clean bare surfaces.

SEALING WING JOINT SPLICES

When the left and right wing panels have been separated, for any reason, all residual groove and fillet sealant in the affected areas must be removed before the assembly is remated. Use only non-metallic scrapers, toluene or cleaning solvent, and rags to loosen and remove both types of sealants. Neither toluene nor cleaning solvent will dissolve either sealant; they will, however, tend to weaken adhesion of the sealant to the painted surfaces. By repeated soaking, scraping, and wiping, the sealants can be removed.

After all structural fasteners in the centerline rib and spar splice plates are in and properly torqued, resealing may be started. Access covers on each side of the centerline rib in the rear spar must be off to permit sealing of the baffle-to-centerline rib joint. (See figure 201.) The sequence of sealing groove-sealed fastener rows is optional. It is recommended that the sealing of each row be commenced by starting with the lowest injection hole and working upward until the entire row is sealed. When all rows have been thoroughly injected with sealant, as evidenced by a small amount of extruded sealant from each injection hole, install injection hole plugs (self-tapping screws) and clean up excess sealant. See figure 201 for sealing diagram.

STOPPING FUEL LEAKS

Leaks may develop at either injection groove sealed areas or at the individually sealed fasteners.

Groove Sealed Areas

Check all bolts in affected area for proper torque before attempting to reseal area. If torque is low, tightening fasteners to the proper values may stop the leak. If fasteners are properly torqued (or tightening does not effect a cure), the area must be reinjected with PR703 sealing compound.

When a first attempt to reseal a groove sealed area is not successful, carefully repeat operation. Extrude a greater amount of sealant from each injection hole than was forced through them during first reseal operation.

Individually Sealed Fasteners

When a leak develops at an individually (O-ring) sealed fastener, check fastener for proper torque and proper seating of fastener head. If screw is too long, the head will not be drawn fully into the countersink. If the hole in the outer sheet is misaligned with the hole in the second member, the fastener head will be tilted. If the countersink is elongated, there will be a gap on one side of the fastener head.

When the fastener installation appears to be satisfactory, the leak can be considered to be caused by a faulty O-ring. Correct leak by removing screw and replacing O-ring with a new one, being very careful not to damage new O-ring during installation.

NOTE

When fastener involved is retained by a bumper nut that cannot be conveniently reached for reinstallation, fastener may be backed out just enough to cut used O-ring loose. New O-ring may then be carefully stretched over fastener head. (See figure 202, 57-30-20 for type of nut used on each fastener installation.)

SEALING REPAIRS

For installation of external sleeve fasteners in fuel sealed areas, see section 51-40-30.

EXTERNAL REPAIR OF LEAKING FASTENERS IN FUEL CELL CLOSE-OUT AREA

A satisfactory repair of leaking fasteners in a fuel closed-out area may be accomplished using the Semco 400A-1 Field Repair Kit, and the following procedures.

NOTE

If repair is to be accomplished on a painted surface, an adhesion test must be performed to ensure that painted surface has retained its adhesion qualities.

REPAIRS (Continued)

Adhesion Test

1. Wipe surface to be tested with a clean cloth to remove all contaminates.
2. Apply a strip of fresh, one in. wide masking tape across area to be tested. Firmly press tape down on surface.
3. In an abrupt upward motion, pull tape from surface.
4. Examine adhesive side of tape for indications that tape has pulled paint away from painted surface. If there are no indications of paint adhering to masking tape, adhesion is acceptable and repair may be made directly on painted surface.

When there are indications of paint on the masking tape, the adhesion qualities of the paint are not acceptable and the finish in the area of repair must be scuff sanded down to the bare metal then a new conversion coating (Alodine, or equivalent) applied before accomplishing the repair.

Repair of Leaking Fastener

CAUTION

Airplane must be grounded to preclude arcing between heating tool and airplane surface.

1. Using MEK clean an area of at least 1 1/2 in. in dia aroung leaking fastener.
2. From the Semco 400A-1 Sealing Kit, obtain heating body, holding fixture and applicable size teflon-coated die.
3. Adjust knurled adjusting screws of holding fixture so that they are midway in adjustment range.
4. Thread teflon-coated die into heater body then screw heater body into holding fixture.
5. Position holding fixture assembly over fastener to be repaired. Turn heater body in holding fixture to bring teflon-coated die down flush with surface being repaired.
6. Remove holding fixture assembly and set aside. Make certain adjustments are not disturbed.
7. Obtain foil repair patch material from Semco kit and trim patch to size. Make repair patch circular in shape whenever possible to eliminate sharp corners. Patch should be at least 1/4 in. in dia larger than head of leaking fastener.
8. Clean faying surfaces of foil repair patch and area where repair is to be applied with MEK. Wipe dry with clean dry cloth.
9. Mix one kit of sealant, (MIL-S-8802 Class B 1/2) from repair kit, per manufacturers direction.
10. If fastener being repaired is leaking fluid, apply sealant directly to leak then wipe away excess sealant.
11. Apply a thin coat of sealant (0.015 to 0.020) to faying surface of foil repair patch. Place foil repair patch, sealant side down, over leaking fastener. Reduce sealant thickness to about 0.010 by applying finger pressure to foil repair patch.
12. Center holding fixture assembly over area to be repaired. Adjust knurled knobs so that teflon-coated die exerts a slight pressure on foil repair patch.
13. Heat cure foil repair patch for a period of 30 minutes using factory pre-set (140°) heating body.

NOTE

In extremely cold areas, cure the foil repair patch for a min of 45 minutes.

14. After repair has cured, remove holding fixture assembly and remove excess sealant from repair area.
15. Repair area may be touched-up with applicable paint/primer immediately after removing holding fixture; however sealant will not be completely cured for 72 hours.

TESTING FOR LEAKS

The wing fuel tank assembly must be pressure-checked for leaks whenever sealed joints that are inaccessible for resealing with the wing installed have been disturbed. Such inaccessible joints include the centerline splice joint, the front spar splice joints, and the inbd rib of the inbd leading edge. Testing must be accomplished before the wing is reassembled to the fuselage.

When the pressure test is being conducted, the left-and right-hand unit interconnecting valve (Whittaker Part No. 134345-4) must be in the open position. This valve is on the left side of the centerline rib. The valve may be reached through an access hole on the left side of the centerline rib in the main spar.

REPAIRS (Continued)

Equipment and Material Required

Air pressure to the wing tank must be controlled by a regulator with a lead-sealed safety valve or similar safety feature that will prevent pressurization of the tank above 7 psig.

The air supply filter must contain a trap for removing water and oil and must be maintained for efficient operation.

Expanding neoprene plugs are recommended for plugging fuel system fittings in the rear spar. Plugs may be made from soft (10 to 20 Shore) neoprene.

Small-leak detection may be accomplished by brushing sealed joints with a detergent or soap solution. Turco Products No. 598 Bubble Fluid, or equivalent, is recommended.

Procedure

Plug all fuel system openings in rear spar with suitable line caps and plugs. Attach air line from regulator to one of the two fuel vent fittings on upper wing skin. These fittings are close to the front spar, just inbd of the fuselage attach rib on either side of the wing.

When the air regulating equipment permits, attach pressure line to one fuel vent fitting and tank pressure-sensing line to the other. When one air line only is used, cap unused fuel vent fitting.

Preliminary Check

To perform preliminary check, pressurize tank to a min of 4 psig and a max of 5 psig. Close inlet valve between air source and tank structure, thus maintaining a static pressure in wing during test. Locate and seal any large leak as evidenced by a rapid pressure drop. These leaks may ocur where a fitting or fastener has been omitted, or where a section of the tank has not been injected with groove-sealant. Repressurize to 4 psig min for 5 psig max. Close inlet valve and allow tank to stand for 15 minutes. If pressure has not dropped one psig, continue with test procedure for fine leaks. Otherwise, recheck structure until rate of pressure drop is less than one psig per 15 minutes.

Final Check

Fine leaks not readily detectable by a pressure drop are checked by brushing the resealed area with a soap or detergent bubble solution. If Turco Products No. 598 Bubble Fluid is used, mix one part of Bubble Fluid to eight parts of tap water. Pressure must be maintained between 4 and 5 psig during the test period. Clearly mark all leaks as evidenced by soap bubbles with a grease pencil. Reseal all leaks, depressurizing tank if necessary. Recheck resealed area(s) after resealing, repressurizing tank as required.

NOTE

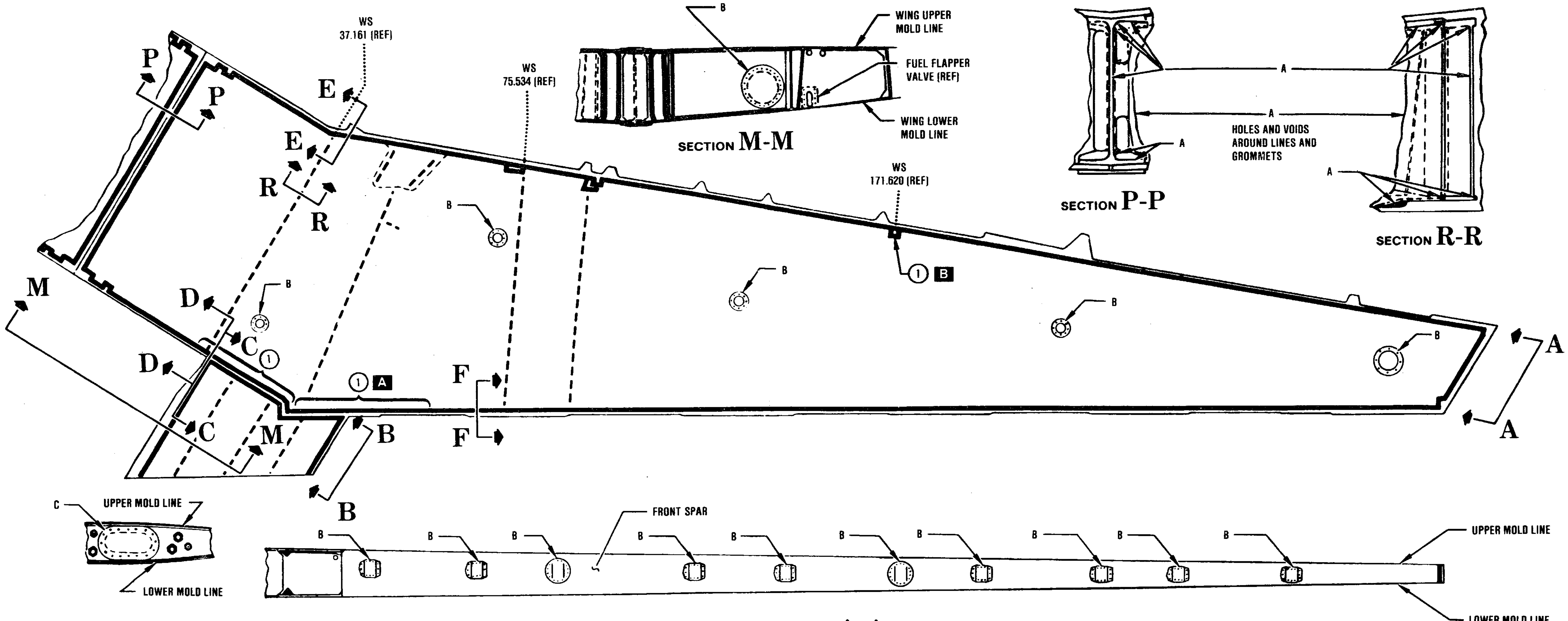
Bubble-solution check is final test for fuel-tightness. All sealed fasteners and sealed joints are potential sources of leakage. A check must be completely and carefully performed.

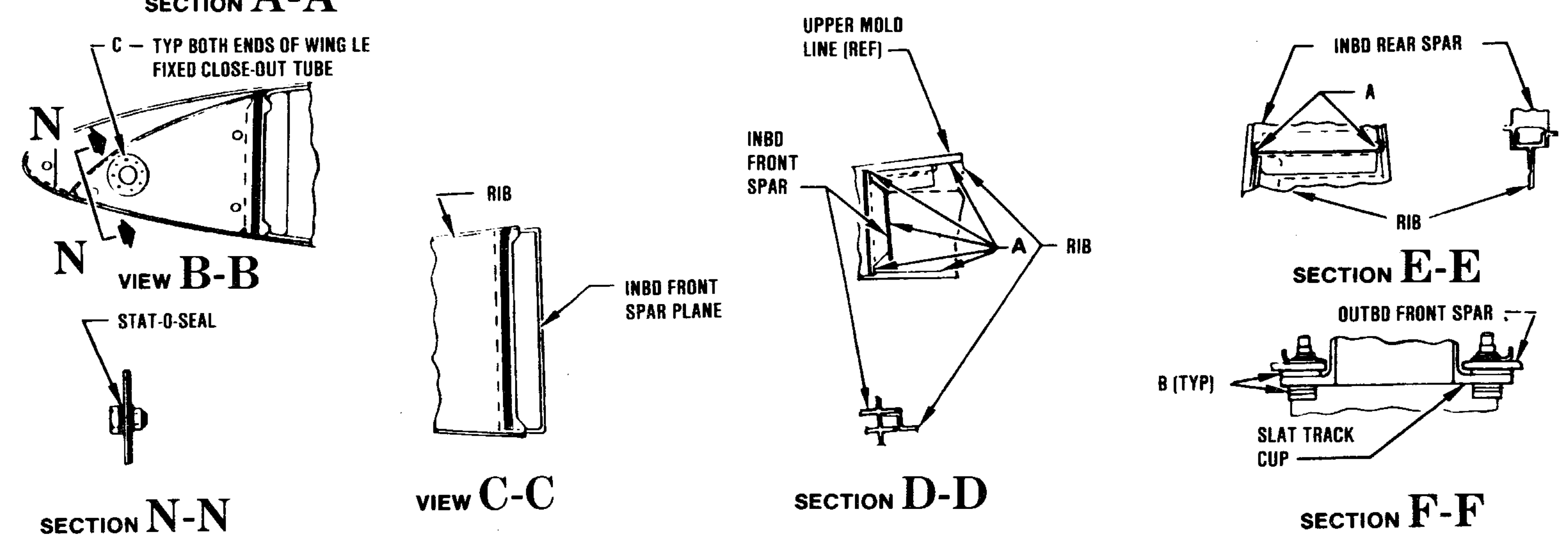
Cleanup

Rinse bubble solution residue from structure with tap water as soon as practical after test is complete.

Securing Wing

Depressurize tank and remove all test plugs and other equipment. If the wing is to stand or be stored for any period following the leak check, all tank openings must be covered with suitable caps or plugs.





NOTES

- ***All rib-to-skin fastener nuts and other hidden nuts are of self-wrenching type, except as indicated by code 1.***
- ***All nuts on fasteners through exposed flanges must be held (or turned) with a wrench, except as indicated by code 1.***

A BUMPER NUTS ARE INSTALLED ON FOUR 5/16 IN. SCREWS IN VICINITY OF WS 37.161 AND ON ALL 1/4 IN. SCREWS BETWEEN WS 37.161 AND 75.534 IN THE MAIN BOX SKIN.

B BUMPER NUTS ARE INSTALLED ON TWO 3/16 IN. SCREWS ON FWD SIDE OF FRONT SPAR AT WS 171.620.

SEAL CODE

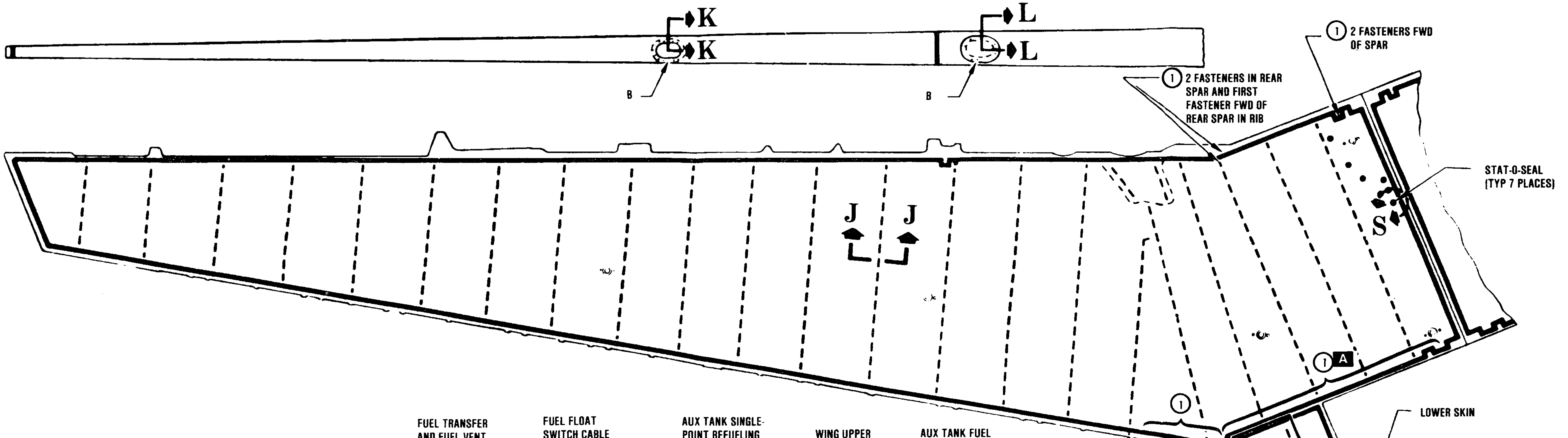
- A Seal with sealing compound. For sealant type, refer to 51-30-00 Table 2A.
- B Sealed with bonded O-ring assembly and Stat-O-Seal washers.
- C Sealed with an O-ring. Fasteners sealed with Stat-O-Seal washers when required.
- (solid line) Sealed by groove injection sealing with PR 703 sealing compound.
- (dashed line) Individually sealed fasteners — O-ring sealed.

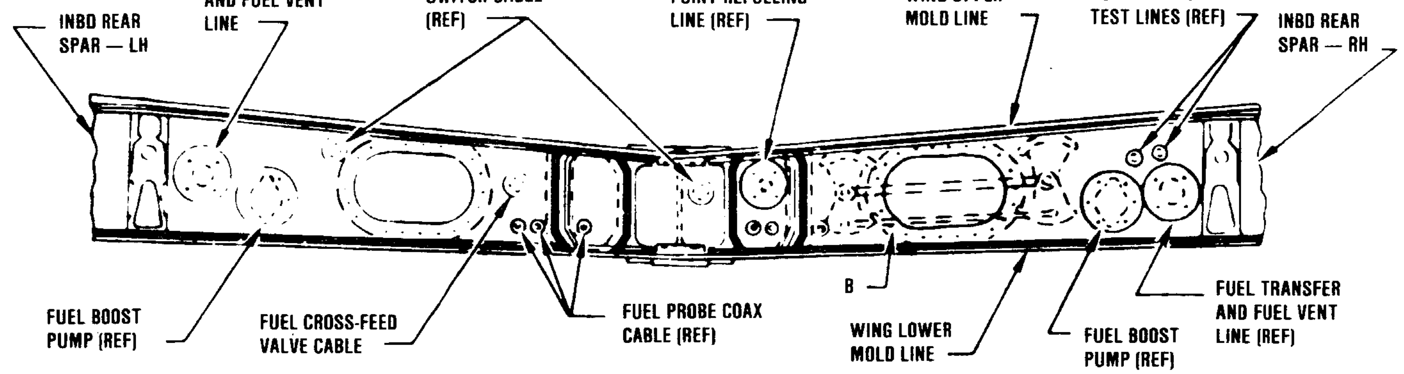
HIDDEN FASTENER CODE

(1) Bumper nut (self-wrenching) must be hand-held until threads are engaged during installation.

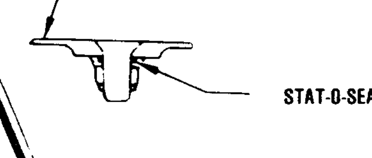
Wing Fuel Tank Sealing Diagram
Figure 201 (Sheet 1 of 3)

S265-3-233A





DETAIL — INBD REAR SPAR



VIEW S

SEAL CODE

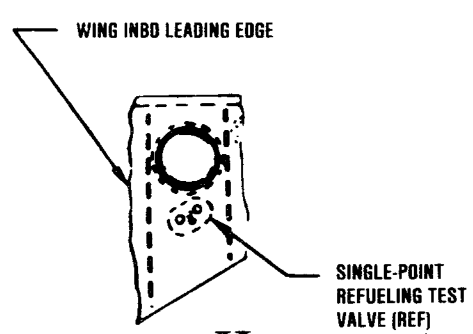
- A Seal with sealing compound. For sealant type, refer to 51-30-00 Table 2A.
- B Sealed with bonded O-ring assembly and Stat-O-Seal washers.
- C Sealed with an O-ring. Fasteners sealed with Stat-O-Seal washers when required.
- ━━ Sealed by groove injection sealing with PR 703 sealing compound.
- - - - Individually sealed fasteners — O-ring sealed.

HIDDEN FASTENER CODE

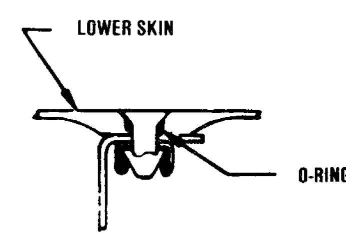
(1) Bumper nut (self-wrenching) must be hand-held until threads are engaged during installation.

NOTES

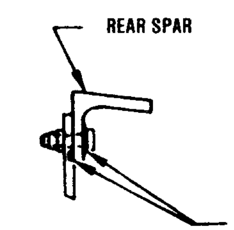
- ***All rib-to-skin fastener nuts and other hidden nuts are of self-wrenching type, except as indicated by code 1.***
- ***All nuts on fasteners through exposed flanges must be held (or turned) with a wrench, except as indicated by code 1.***
- **A** BUMPER NUTS ARE INSTALLED ON 1/4 and 5/16 IN. SCREWS INBD OF WS 65.810.



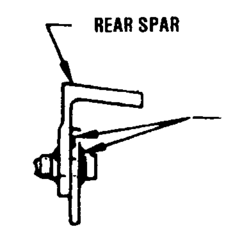
VIEW H
(RH ONLY)



SECTION J-J



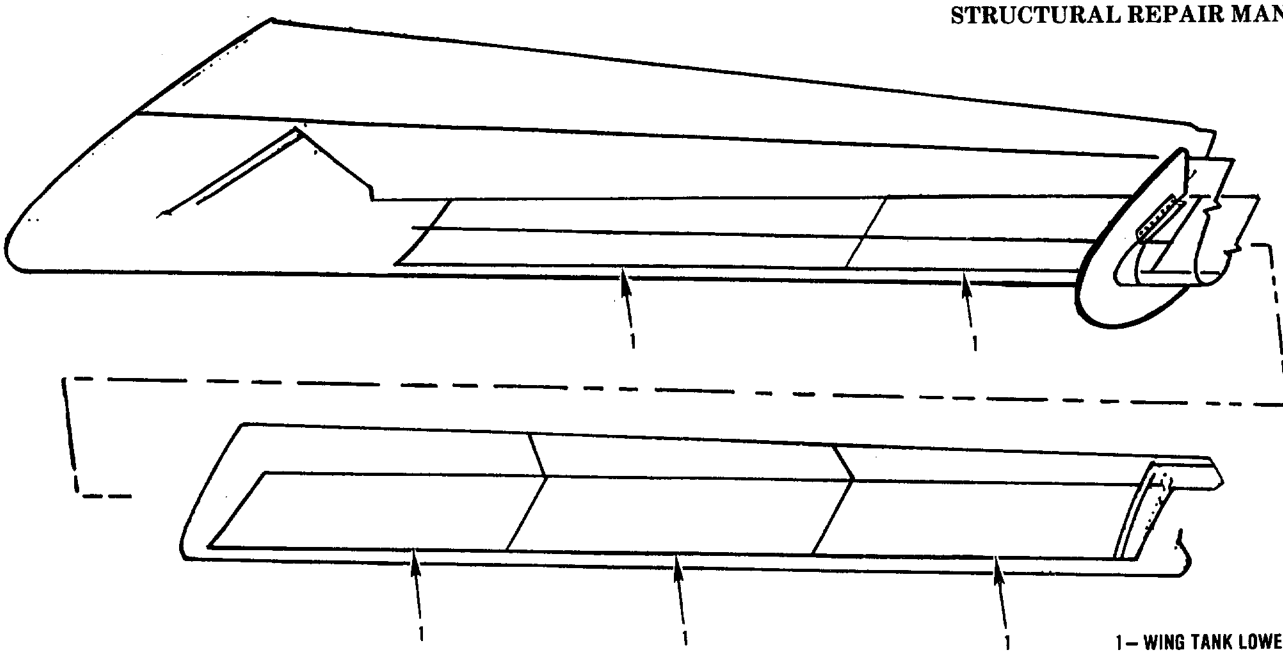
SECTION K-K

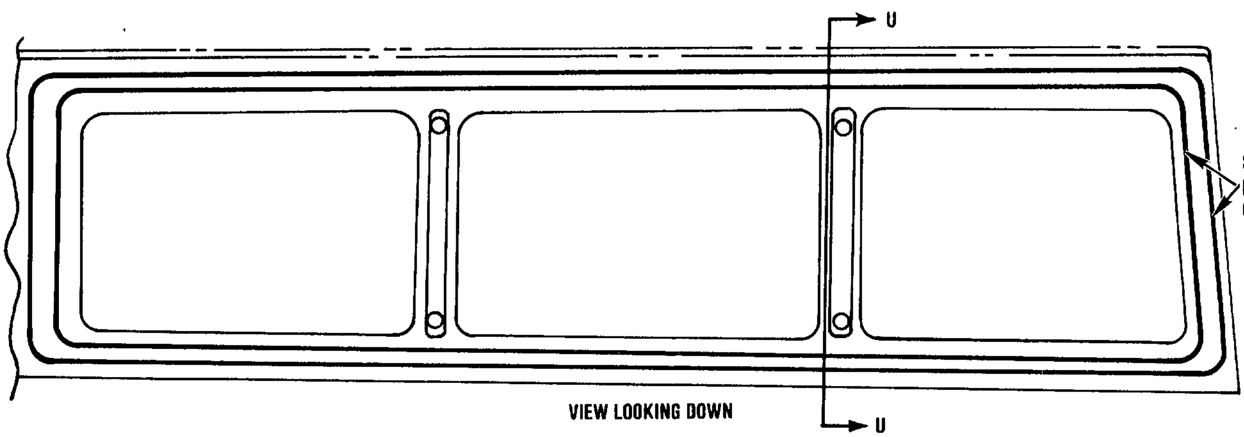


SECTION L-L

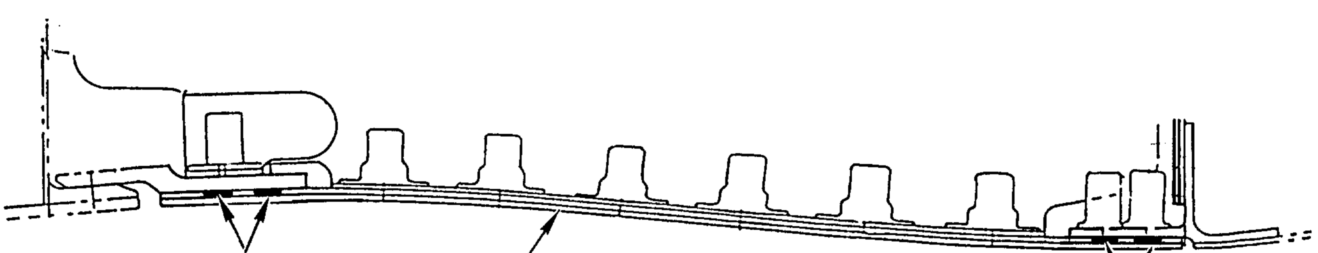
S265-3-234A

Wing Fuel Tank Sealing Diagram
Figure 201 (Sheet 2 of 3)





LOWER LEADING EDGE PANELS
VIEW T

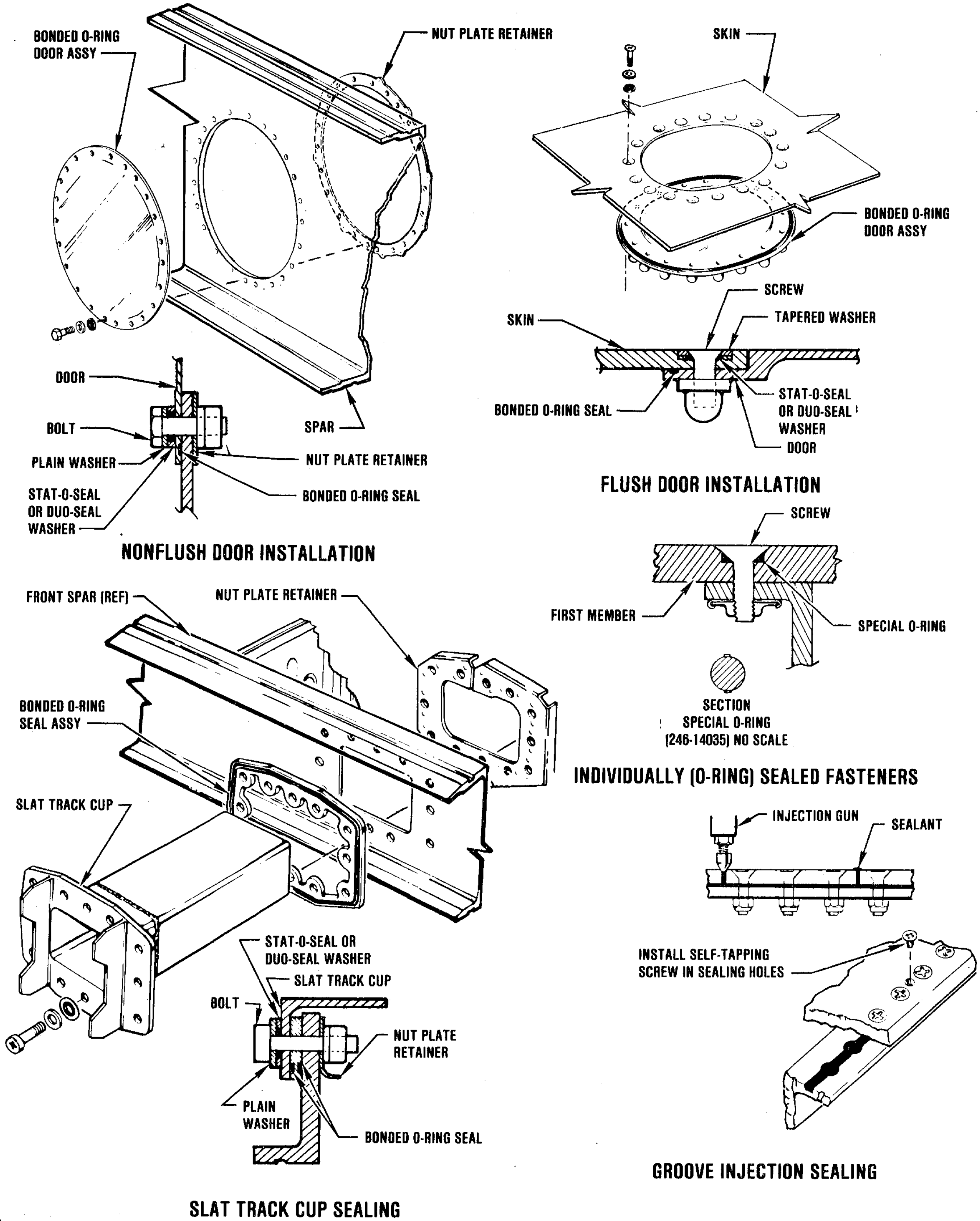


SECTION U-U

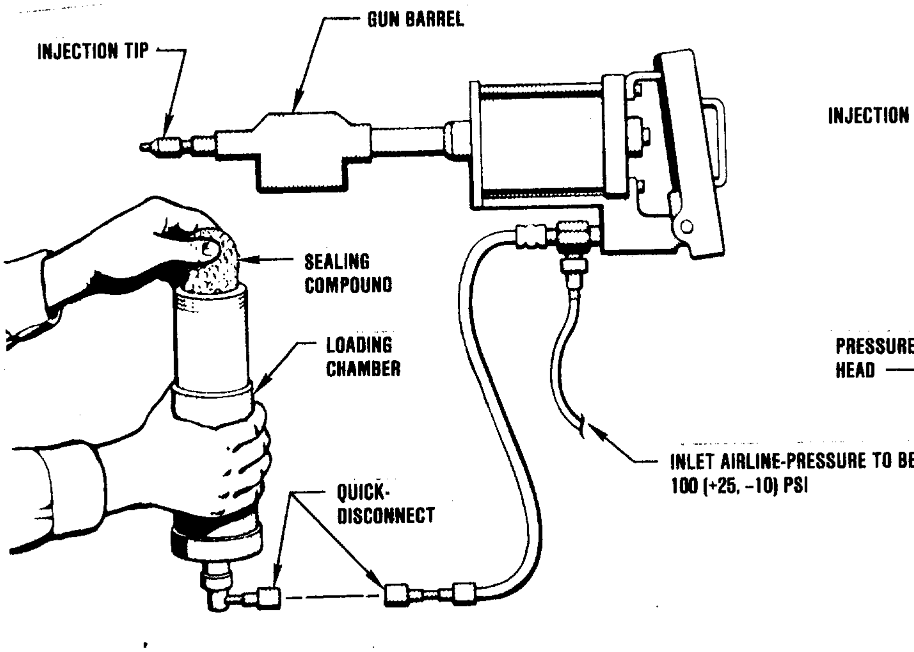
(MODEL NA265-60A, -60 SC, -65, -80A, and -80SC)

NEW

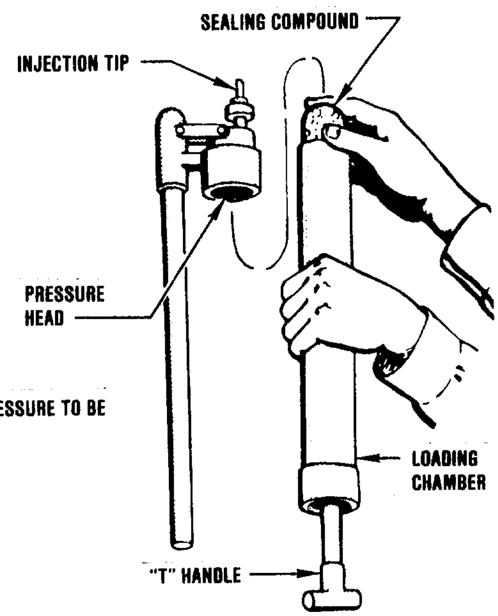
Wing Fuel Tank Sealing Diagram
Figure 201 (Sheet 3 of 3)



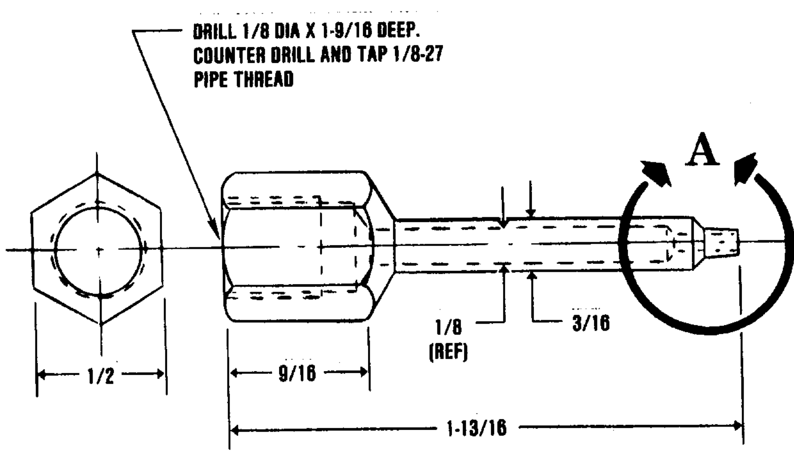
Sealing Methods
Figure 202



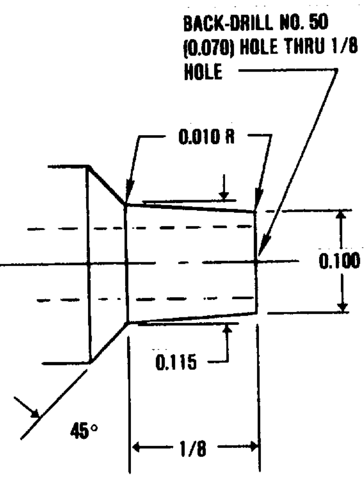
LOADING AIR INJECTION GUN



LOADING HAND INJECTION GUN



SPECIAL INJECTION TIP



DETAIL A

1 Make from AISI 4140 steel.

2 Heat-treat 200,000 to 220,000 psi.

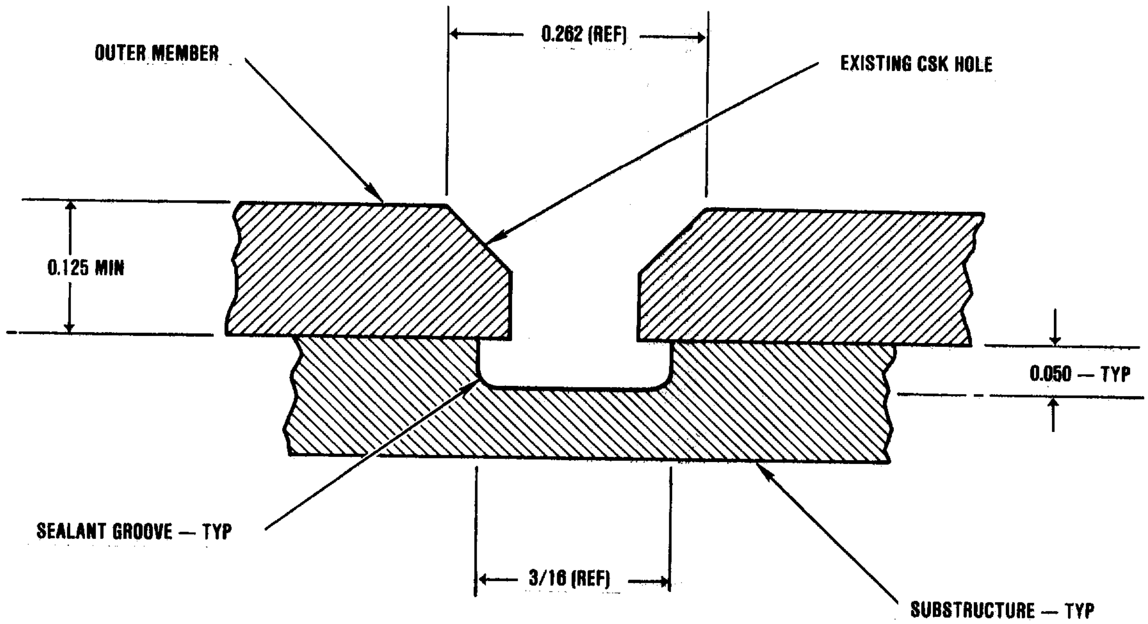
3 Clean No. 50 and 1/8 in. holes after heat-treating.

NOTE

HANDS MUST BE CLEAN AND OIL-FREE BEFORE HANDLING SEALANT.

S285-3-236

Sealant Injection Guns
Figure 203



SECTION THROUGH SEALANT INJECTION HOLE

1 Drill through outer member only, using a flat-angled (135°), No. 29 (0.136 in. dia) drill.

CAUTION

DO NOT DRILL INTO SUBSTRUCTURE. DEPTH-GAUGE EACH HOLE TO DETERMINE DISTANCE TO SURFACE OF SUBSTRUCTURE BEFORE DRILLING. *SUBSTRUCTURE MUST NOT BE DRILLED.*

2 Tap No. 29 hole with 8-32 NC3A plug (modified) and bottom taps. **A**

3 Remove one sealant injection hole screw adjacent to tapped hole. Inject sealant to clear seal groove of chips.

4 Repeat step 3, extruding sealant through opposite adjacent hole.

5 Clean sealant from countersink of tapped hole with MEK.

6 Prime and paint countersink of tapped hole.

7 Install NAS1081-08A3 or NAS1081C08A3L setscrew in tapped hole. Tighten setscrew lightly against bottom of sealant groove.

8 Where desired for aerodynamic smoothness, fill countersink with aerodynamic filler.

9 Refinish to match surrounding area.

NOTES

- THIS REPAIR IS APPLICABLE TO STRIPPED OUT INJECTION HOLES IN WING.
- SETSCREWS MUST BE REMOVED WHEN RESEALING WING.

A PLUG TAP MUST BE MODIFIED TO SERVE AS STARTING TAP. GRIND TAP SO THAT IT HAS A TWO-THREADED LEAD. BEFORE USING MODIFIED TAP ON WING, EXPERIMENT BY TAPPING COUNTERSUNK TRAIL HOLES IN 0.125 IN. SHEET. PILOT DRILL AND COUNTERSINK 100° BY 0.262 IN. BOTTOMING TAP MAY ALSO BE MADE BY GRINDING LEAD END OF PLUG TAP SO THAT ONE LEAD THREAD REMAINS. AGAIN, EXPERIMENT BY FINISH-TAPPING STARTER-TAPPED TRAIL HOLES IN 0.125 IN. SHEET METAL.

S370-3-65

Repair of Stripped Sealant Injection Holes
Figure 204

PLATES AND SKINS

REPAIRS

GENERAL

The lower skin is the close-out skin on the main box assembly. Preparations for lower skin removal includes separation of the panels, and removal of the landing gear, flight control surfaces, and certain pieces of fixed structure. A holding fixture to prevent possible warpage of the structure and a fixture (with slings) for inverting the wing comprise the special equipment necessary. Suggested methods for building the wing rotating fixture and wing holding fixture are shown in section 57-10-20. Figures 201 thru 216 cover repairs to plates and skins.

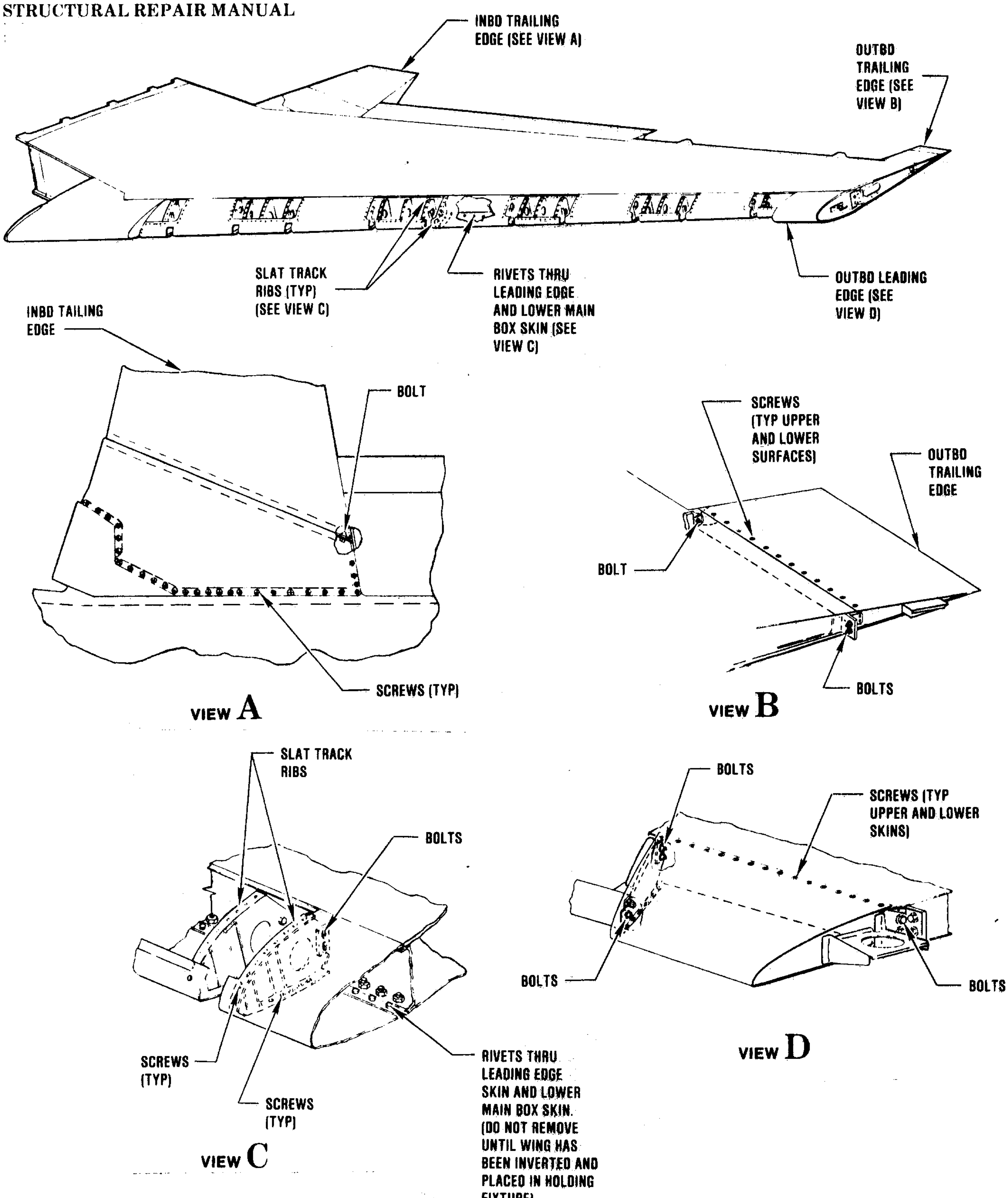
STRIPPING WING

Perform the following operations in accordance with instructions in applicable maintenance manual:

1. Remove wing panel from airplane.
2. Separate wing panels.
3. Remove slats and slat track rollers.
4. Remove wing tip fairing.
5. Remove aileron and aileron control sector assembly.
6. Remove flap, flap actuator, and inbd flap track (latter to permit installation of wing rotating fixture).
7. Remove main landing gear chassis and door assemblies.
8. Remove main landing gear downlock and strut door hinge assemblies.
9. Remove main landing gear uplock actuating cylinder (to permit installation of wing rotating fixture).
10. Remove following wing assembly components as indicated in figure 201: slat track ribs, outbd leading edge, outbd trailing edge, inbd trailing edge, and two small trailing edge skin panels (one adjacent to inbd end of flap and other under landing gear uplock assembly).
11. Remove following miscellaneous fasteners through lower skin (figure 201, this section) underslat leading edge rivets, intermediate trailing edge rib rivets, aileron hinge rivets (Hi-Shear), and flap track bolts. Rivets through underslat leading edge and lower skin should not be removed, however, until wing has been turned over and placed in holding fixture.

ROTATING THE WING

Refer to 57-10-20.

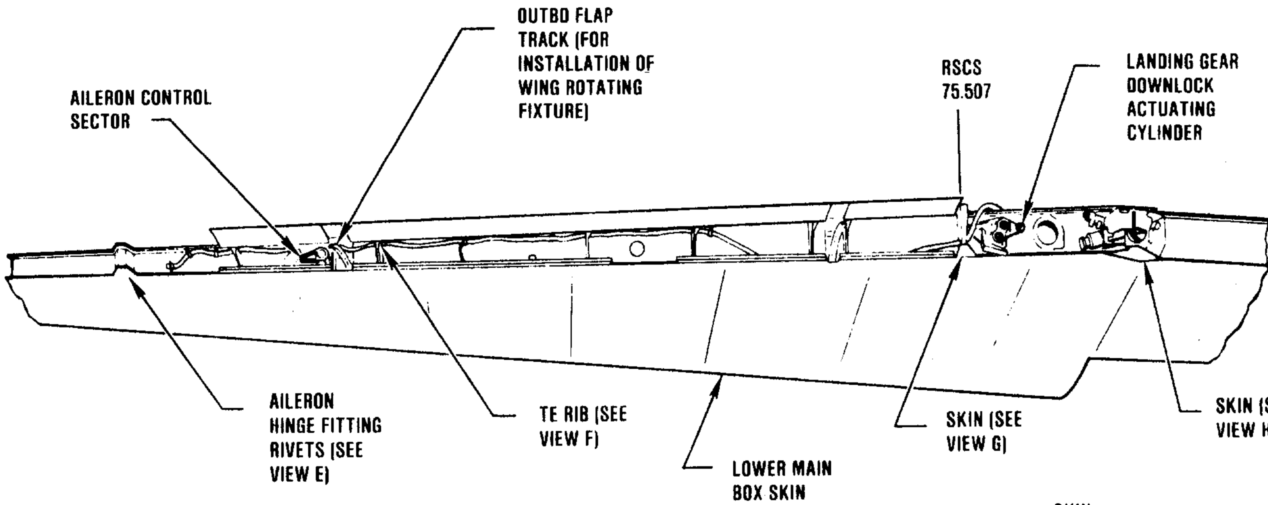


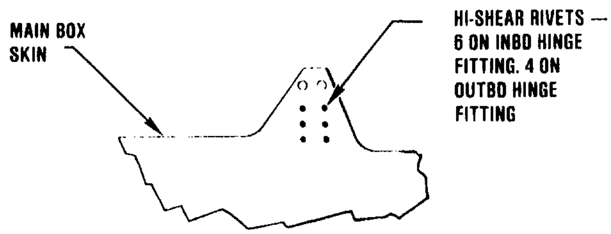
NOTE

THIS ILLUSTRATION SHOWS COMPONENTS AND FASTENERS THAT MUST BE REMOVED BEFORE MAIN BOX LOWER SKIN CAN BE REMOVED.

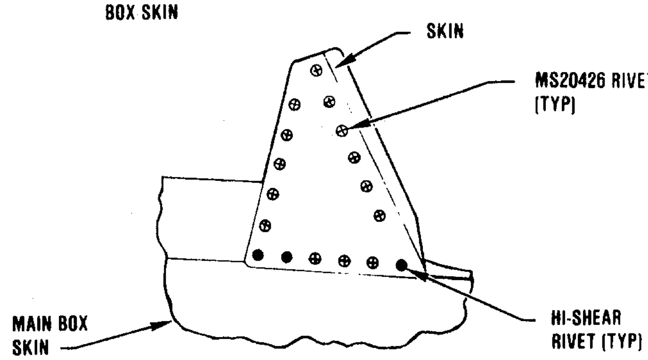
S265-3-231

Lower Main Box Skin Removal
Figure 201 (Sheet 1 of 2)

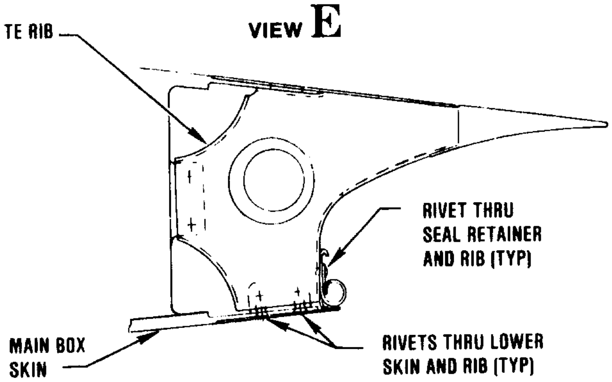




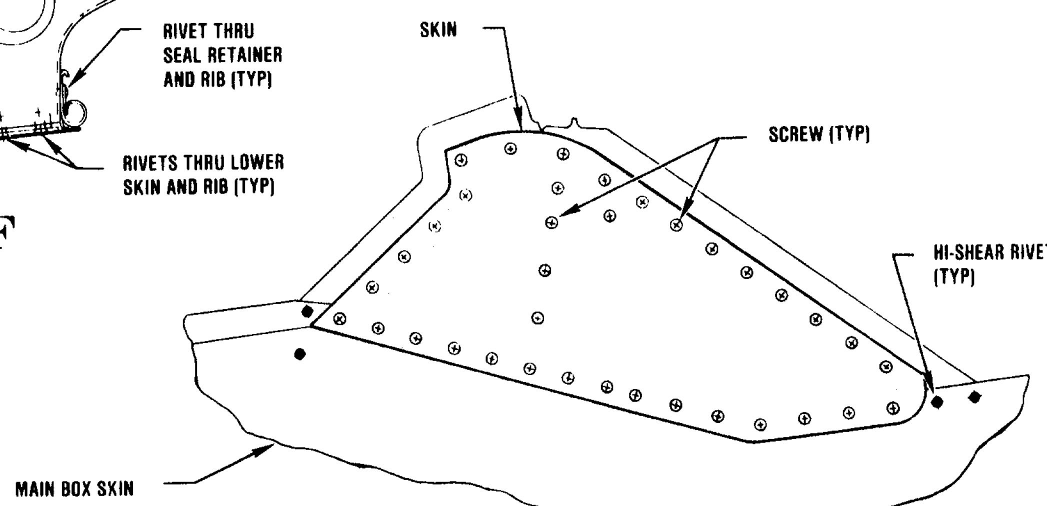
VIEW E



VIEW G



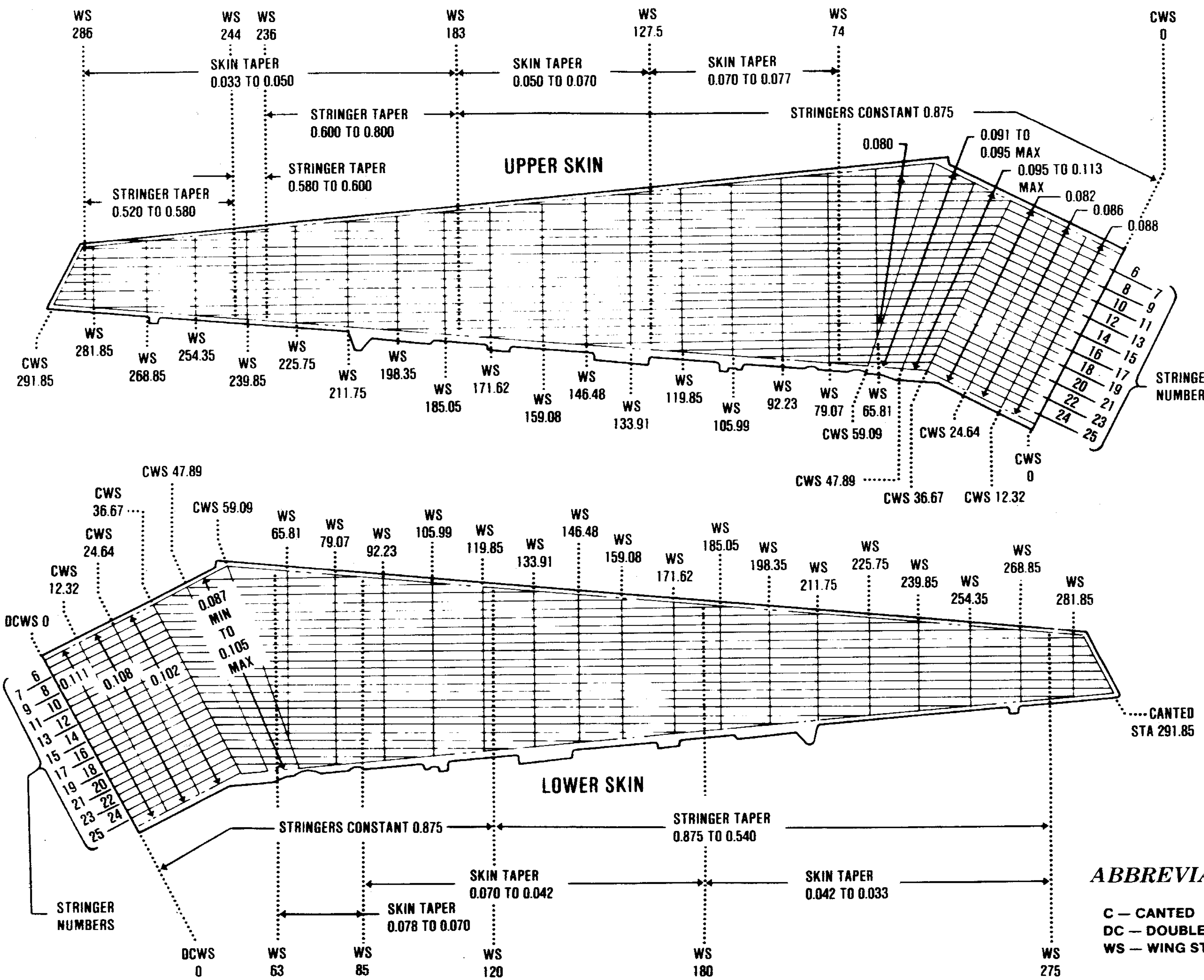
VIEW F



VIEW H

S265-3-232

Lower Main Box Skin Removal
Figure 201 (Sheet 2 of 2)



ABBREVIATIONS

C — CANTED
DC — DOUBLE CANTED
WS — WING STATION

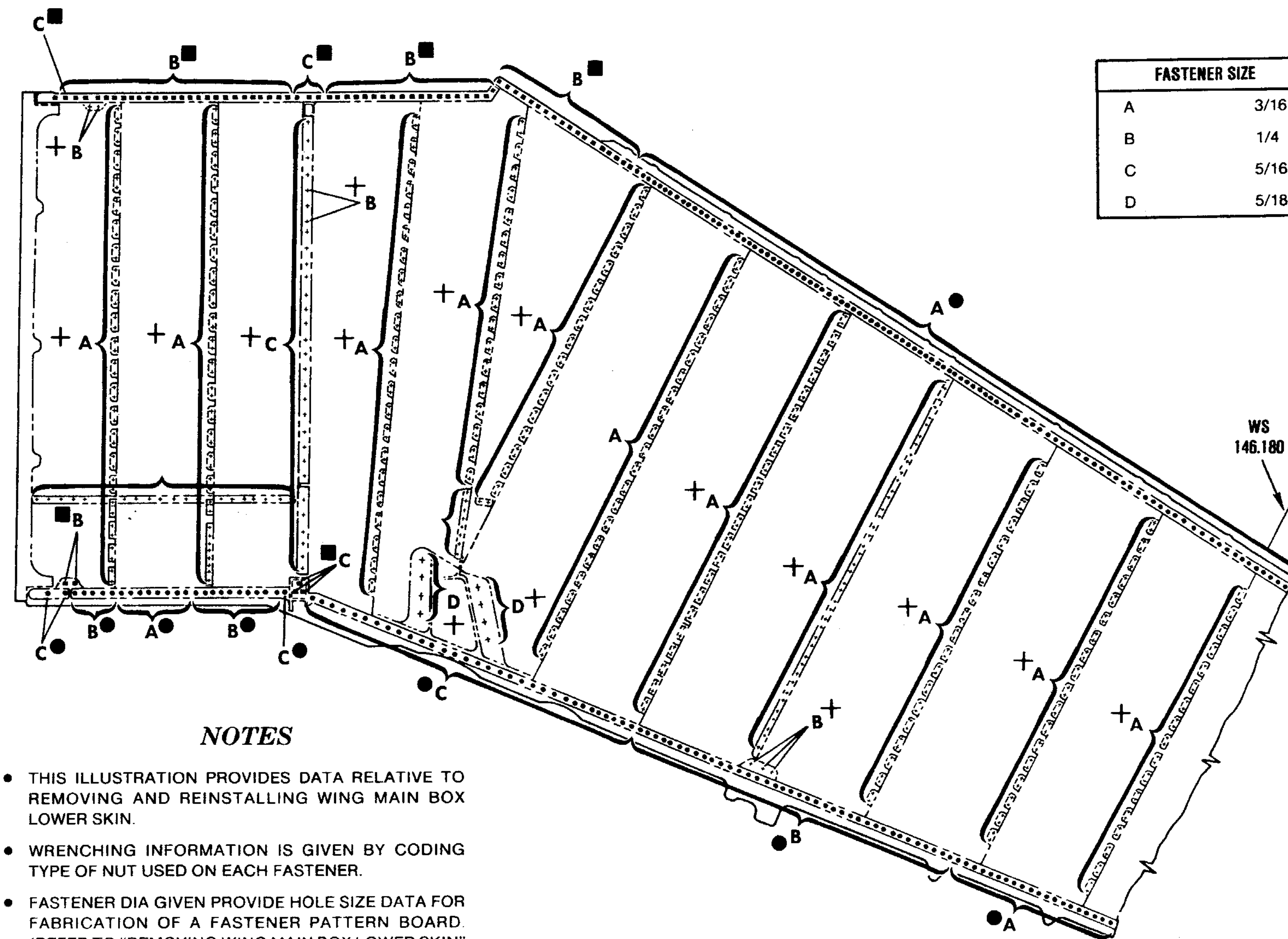
Machined Box Skin Thickness Diagram
Figure 202

FASTENER TYPE (NUT)
● NUT (Requires wrench)
+ NUT PLATE (Self-wrenching)
■ BUMPER NUT (Self-wrenching — must be hand-held until threads are engaged during installation)

CAUTION

WHEN REPLACING ANY SCREW WITH A NEW ONE, MEASURE DIA OF FASTENER BEING REPLACED. A "SALVAGE" FASTENER OF EITHER 0.064 OR 0.032 IN. OVERSIZE DIA MAY HAVE BEEN USED IN INITIAL INSTALLATION.

FASTENER SIZE	
A	3/16
B	1/4
C	5/16
D	5/18

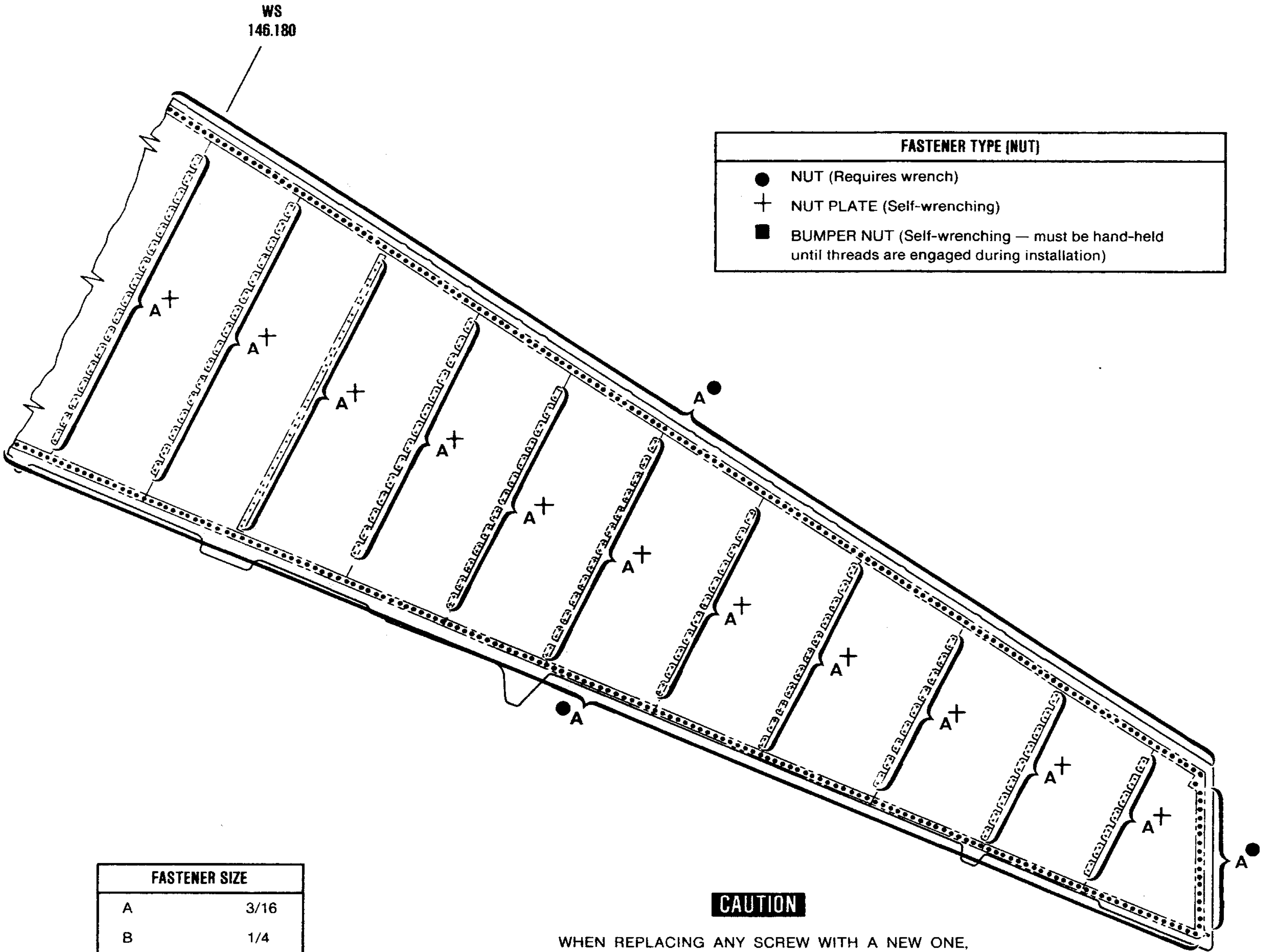


NOTES

- THIS ILLUSTRATION PROVIDES DATA RELATIVE TO REMOVING AND REINSTALLING WING MAIN BOX LOWER SKIN.
- WRENCHING INFORMATION IS GIVEN BY CODING TYPE OF NUT USED ON EACH FASTENER.
- FASTENER DIA GIVEN PROVIDE HOLE SIZE DATA FOR FABRICATION OF A FASTENER PATTERN BOARD. (REFER TO "REMOVING WING MAIN BOX LOWER SKIN" IN TEXT.)

S285-3-237

Wing Panel Lower Skin Fastener Diagram
Figure 203 (Sheet 1 of 2)



FASTENER TYPE (NUT)	
●	NUT (Requires wrench)
+	NUT PLATE (Self-wrenching)
■	BUMPER NUT (Self-wrenching — must be hand-held until threads are engaged during installation)

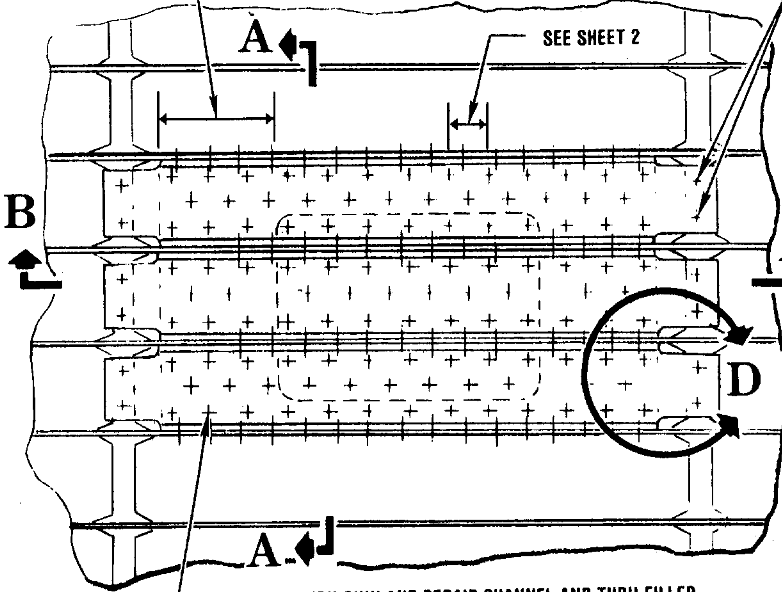
FASTENER SIZE	
A	3/16
B	1/4
C	5/16
D	5/18

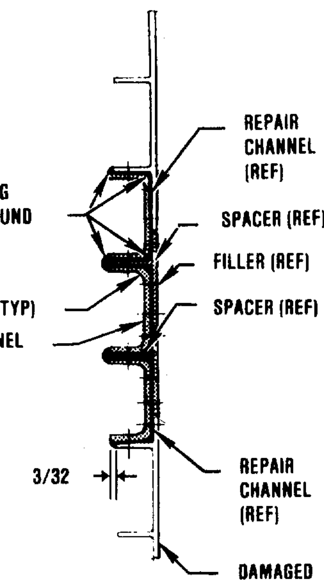
CAUTION

WHEN REPLACING ANY SCREW WITH A NEW ONE, MEASURE DIA OF FASTENER BEING REPLACED. A "SALVAGE" FASTENER OF EITHER 0.064 OR 0.032 IN. OVERSIZE DIA MAY HAVE BEEN USED IN INITIAL INSTALLATION.

8265-3-238

Wing Panel Lower Skin Fastener Diagram
Figure 203 (Sheet 2 of 2)

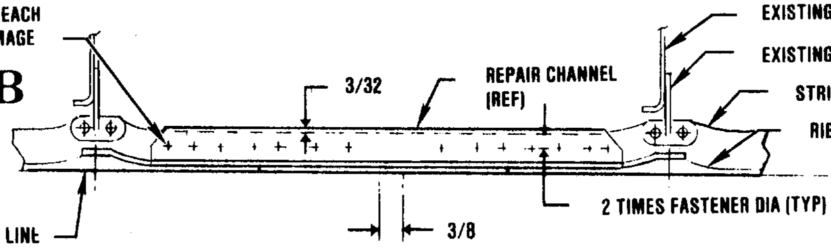




SECTION A-A

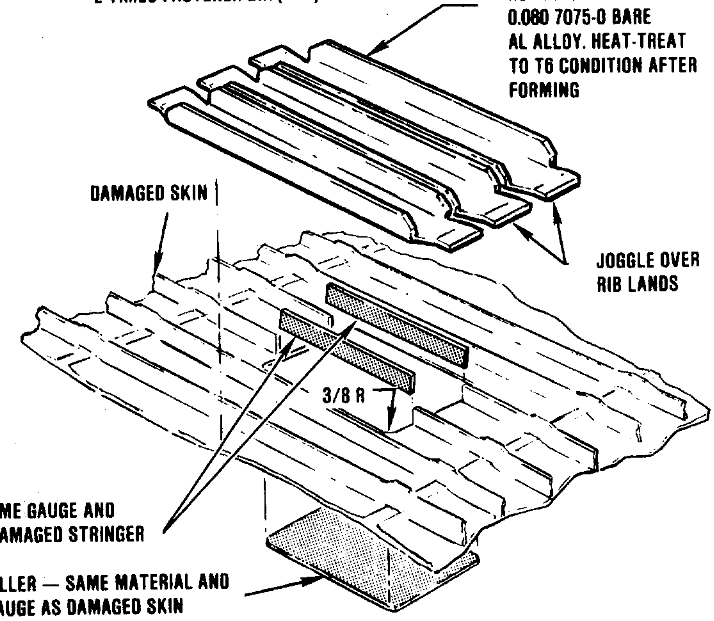
RIVETS — AN470AD5 — INBD OF WS 225
AN470AD4 RIVETS — OUTBD OF WS 225
4 MIN REQD EACH SIDE OF DAMAGE

SECTION B-B



FASTENERS REQUIRED

BETWEEN WS	FASTENER	NO. REQD [A]
12 (CANTED) AND 24 (CANTED)	HS47-6	11
47 (CANTED) AND 59 (CANTED)	HS47-6	11
65 AND 185	HS47-6	8
185 AND 225	NAS1097AD5	11



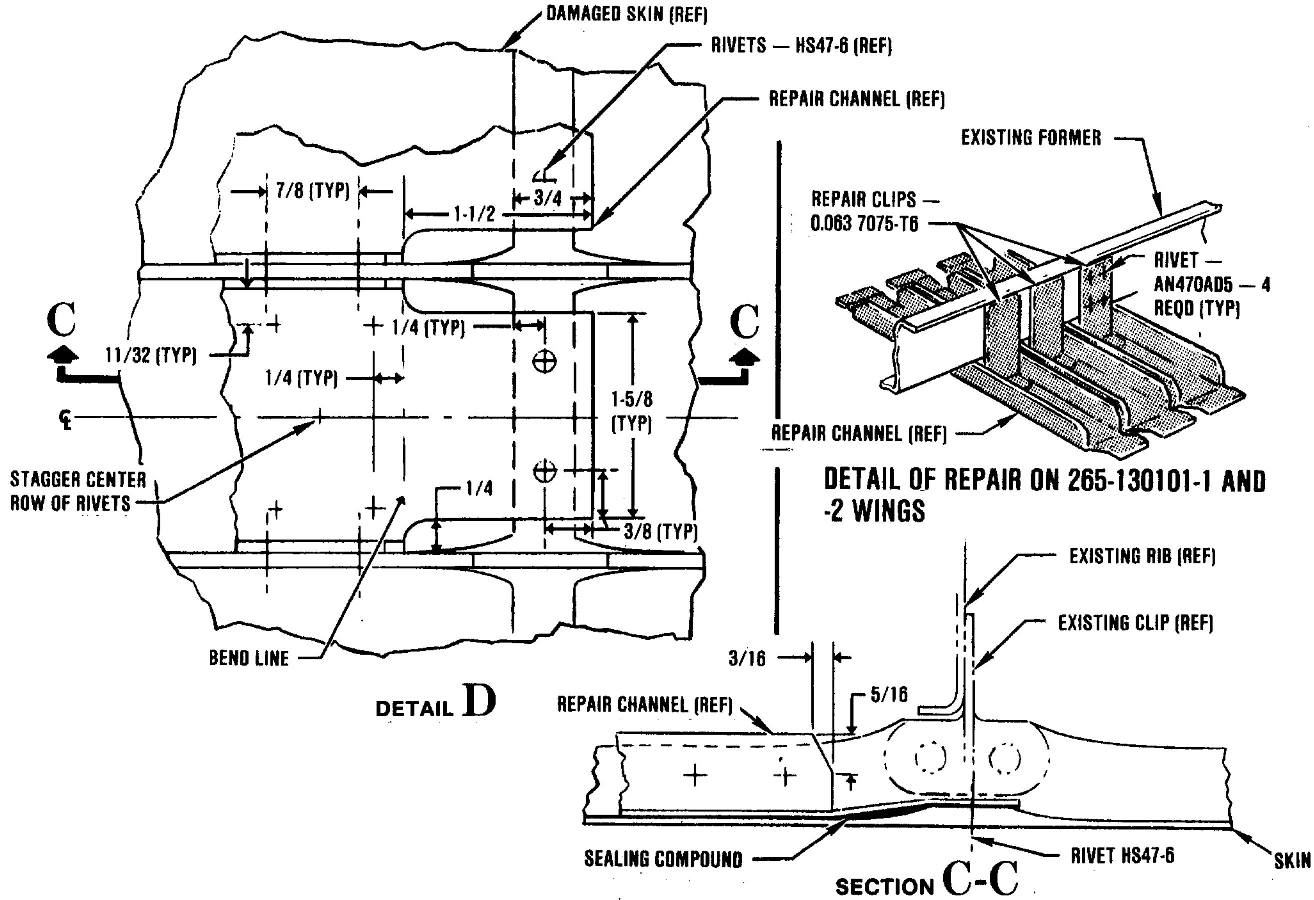
NOTES

- THIS REPAIR IS APPLICABLE TO AREAS GIVEN IN FASTENER REQUIREMENT CHART ONLY.
- REFER TO SHEET 2 FOR STEPS AND FABRICATION DETAILS.

[A] IN EACH REPAIR CHANNEL, EACH SIDE OF DAMAGE.

S265-3-257

Upper Machine Box Skin Repair
Figure 204 (Sheet 1 of 2)



1 Dye-penetrant-check damaged area to determine extent of damage.

2 Trim out damage. Burr all edges.

3 Make filler to match trimmed-out skin area.

4 Make spacers to match removed stringers.

5 Make repair channels from 7075-O and heat-treat to 7075-T6 condition after forming.

6 Position repair channels and drill fastener holes through repair channel and skin. Temporarily fasten repair channel in place.

7 Install filler, and drill fastener holes through repair channels and filler.

NOTE

REFERENCED WING SKINS INCORPORATE A SKIN FORMER BETWEEN EACH RIB. WHEN REPAIRING SKINS WITH FORMERS, REMOVE DIE-FORGED CLIPS THAT ATTACH FORMER TO SKIN (IN REPAIR AREA) AND REPLACE THEM WITH SHEETMETAL CLIPS AS SHOWN. ADJUST RIVET PATTERN AS NECESSARY TO PICK UP TWO FASTENERS THROUGH SKIN AT EACH REPAIR CLIP.

8 Remove repair parts and clean off all chips and other foreign matter.

9 Cati-coat prime spacers and repair channels.

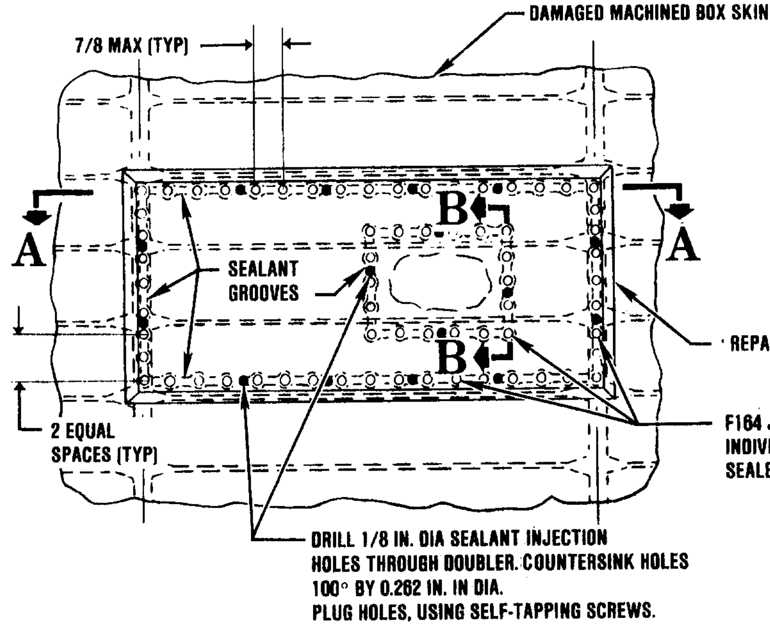
10 Apply sealing compound to faying surfaces as instruced in 57-40-30, and rivet repair parts in place. Drive all rivets in skin surface before driving those in stiffening members.

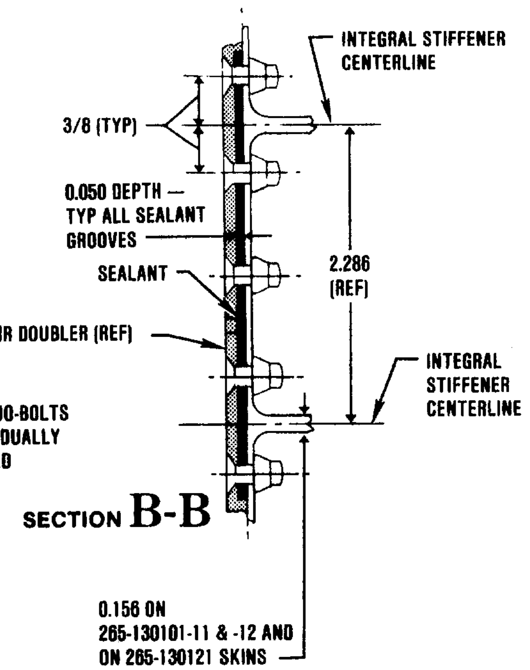
11 Complete sealing operations.

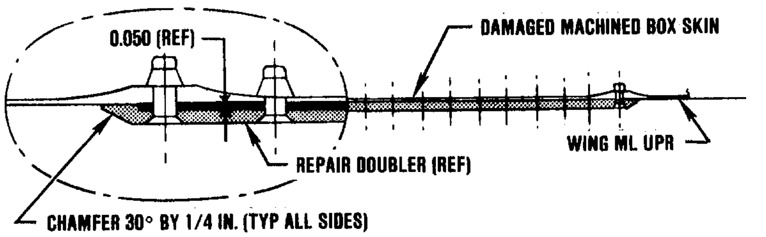
12 Refinish external surface of repair to match surrounding area.

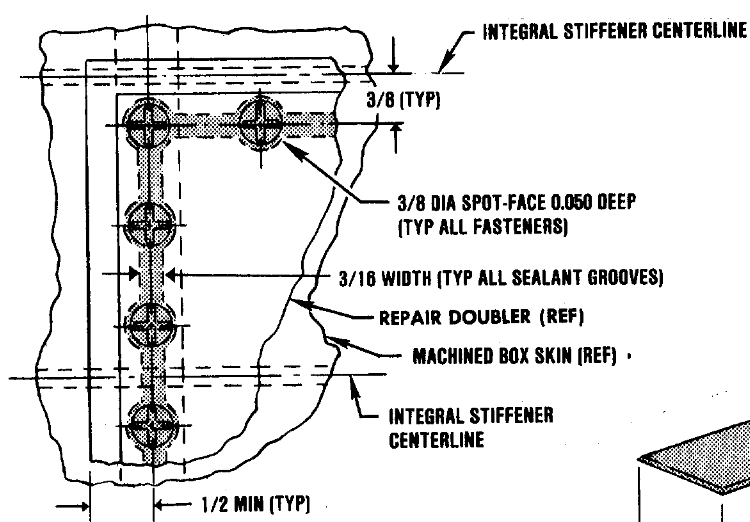
S265-3-258

Upper Machined Box Skin Repair
Figure 204 (Sheet 2 of 2)









1 Smooth or trim all rough edges in damaged area. File or grind out cracks. Using dye-penetrant solution, check whether surrounding area is damaged.

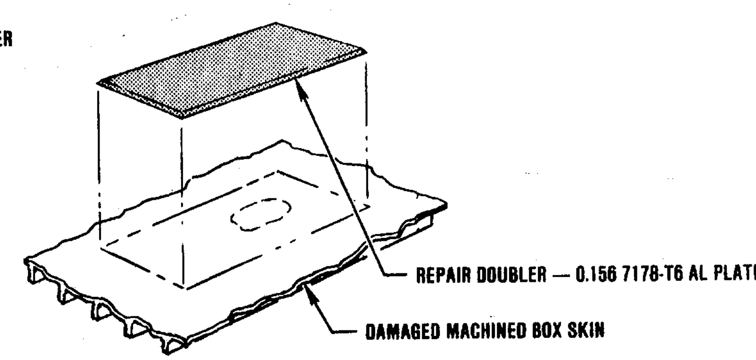
2 Lay out repair doubler so that it covers one stringer bay fwd and aft of damaged section, and extends so that it picks up existing fasteners in adjacent ribs on remaining two sides.

3 Machine sealant goroves on inner surface of repair doubler as required. Spot-face area 3/8 in. in dia by 0.050 in. deep around fasteners on sealant grooves.

4 Drill 1/8 in. dia sealant injection holes in doubler on centerline of machined sealant grooves. Distance between sealant injection holes must not exceed 3 in.

5 Install repair doubler, using F164 Jo-Bolts. Jo-Bolts are to be installed as instructed in 51-40-30, figure 2.

6 Inject sealant into sealant injection holes, and plug injection holes.

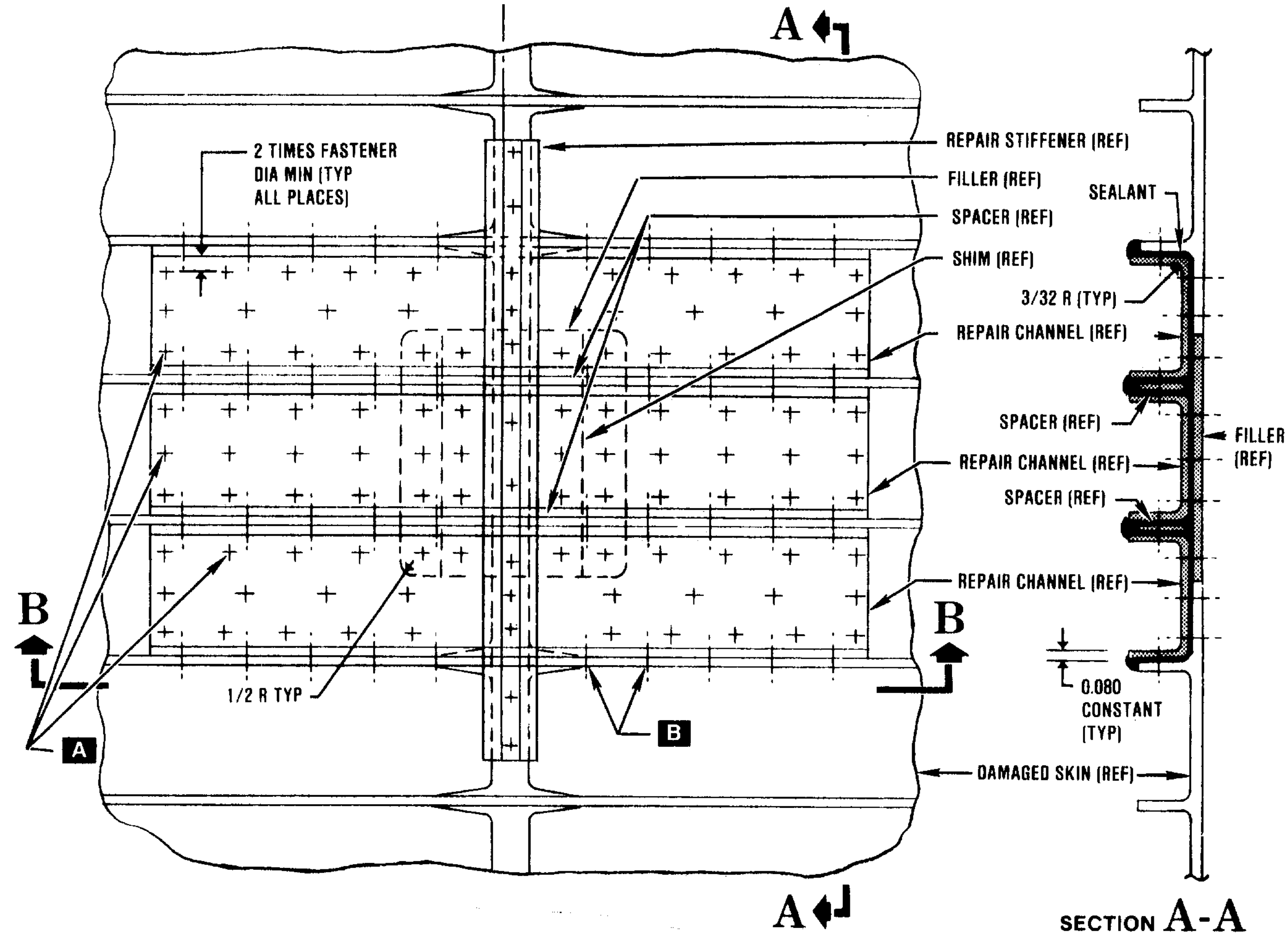


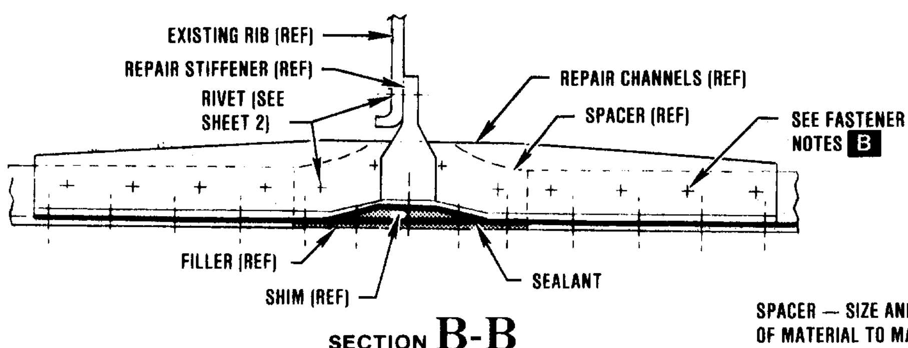
NOTE

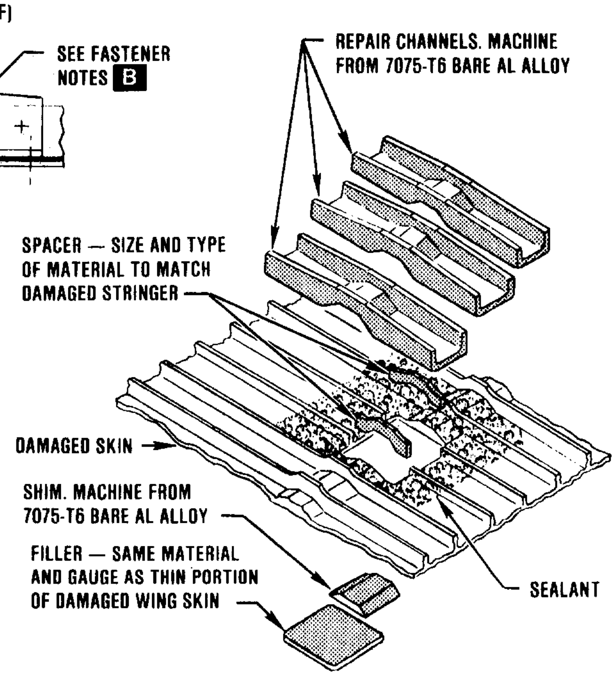
IF DAMAGE IS LOCATED INBD OF WS 65.00, MAKE REPAIR DOUBLER ONE GAUGE HEAVIER THAN GAUGE INDICATED.

S265-3-266

Upper Machined Box Skin Repair — Class B
Figure 205







NOTES

- REFER TO STEPS ON SHEET 2.
- RIVET PATTERN SHOULD BE AS SHOWN.

A USE NAS1097DD6 RIVETS, ONE IN. SPACING ON CENTER, INBD OF WS 183. USE NAS1097AD5 RIVETS, 7/8 IN. SPACING ON CENTER, BETWEEN WS 183 AND 211.750. USE NAS1097AD4 RIVETS, 3/4 IN. SPACING ON CENTER, OUTBD OF WS 211.750.

B USE AN470AD5 RIVETS INBD OF WS 263; USE AN470AD4 RIVETS OUTBD OF WS 263.

S265-3-262

Upper Machined Box Skin Land Repair
Figure 206 (Sheet 1 of 2)

1 Dye-penetrant-check damaged area, to determine extent of damage.

2 Trim damage from area, and smooth all edges and corners.

3 Machine shim same size as machined rib land on inner surface of skin.

4 Make filler same size as damage cutout in damaged skin.

5 Machine repair channels to correspond with inner surface of skin.

6 Machine repair stiffener (except for stringer cutouts) and form to match skin contour. Machine stringer cutouts.

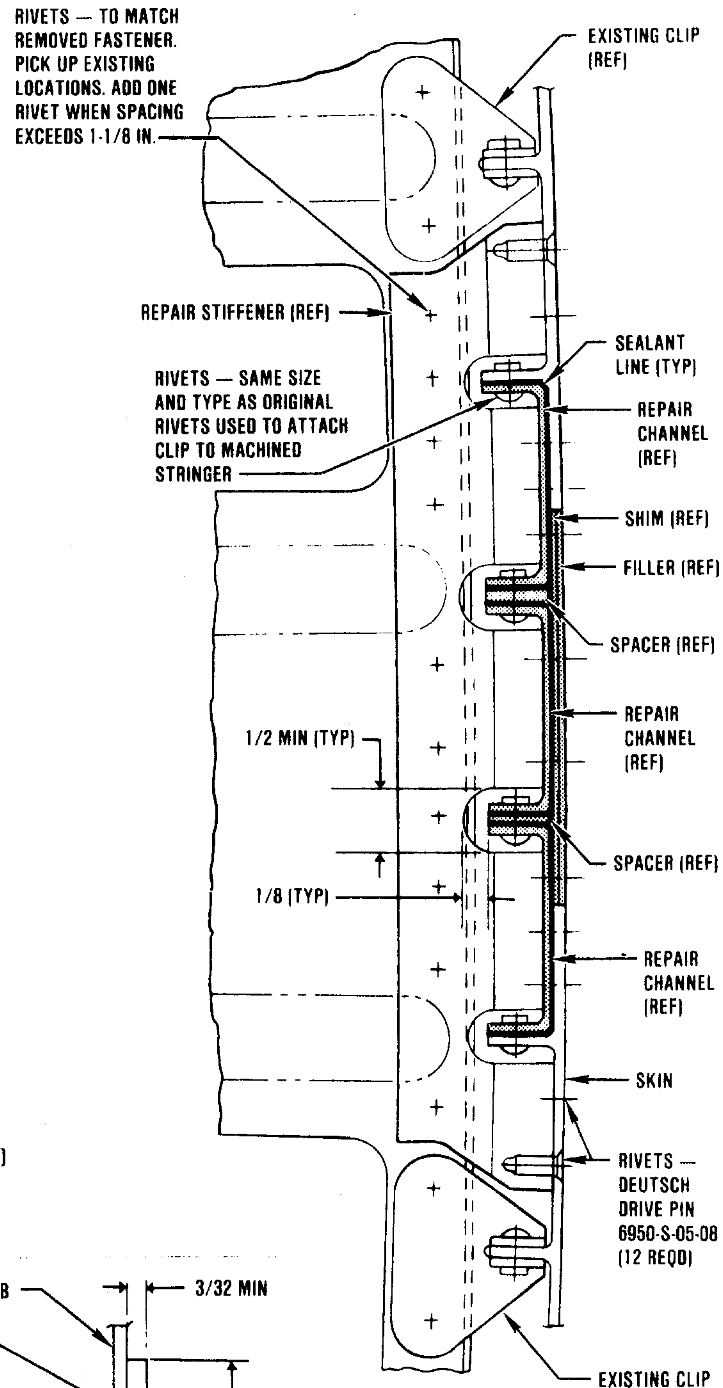
7 Assemble components and perform drilling and countersinking operations.

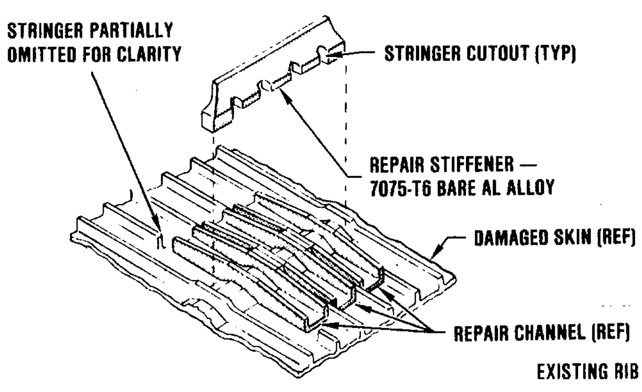
8 Cati-Coat prime all repair parts and bare areas of skin interior.

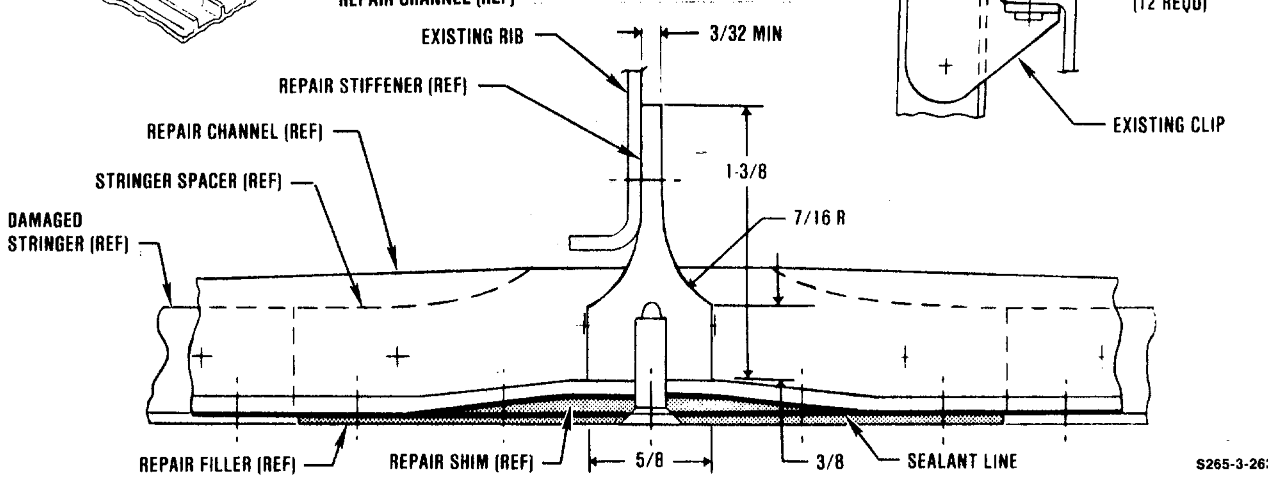
9 Apply sealing compound to all faying surfaces.

10 Rivet repair parts in place and complete sealing operations.

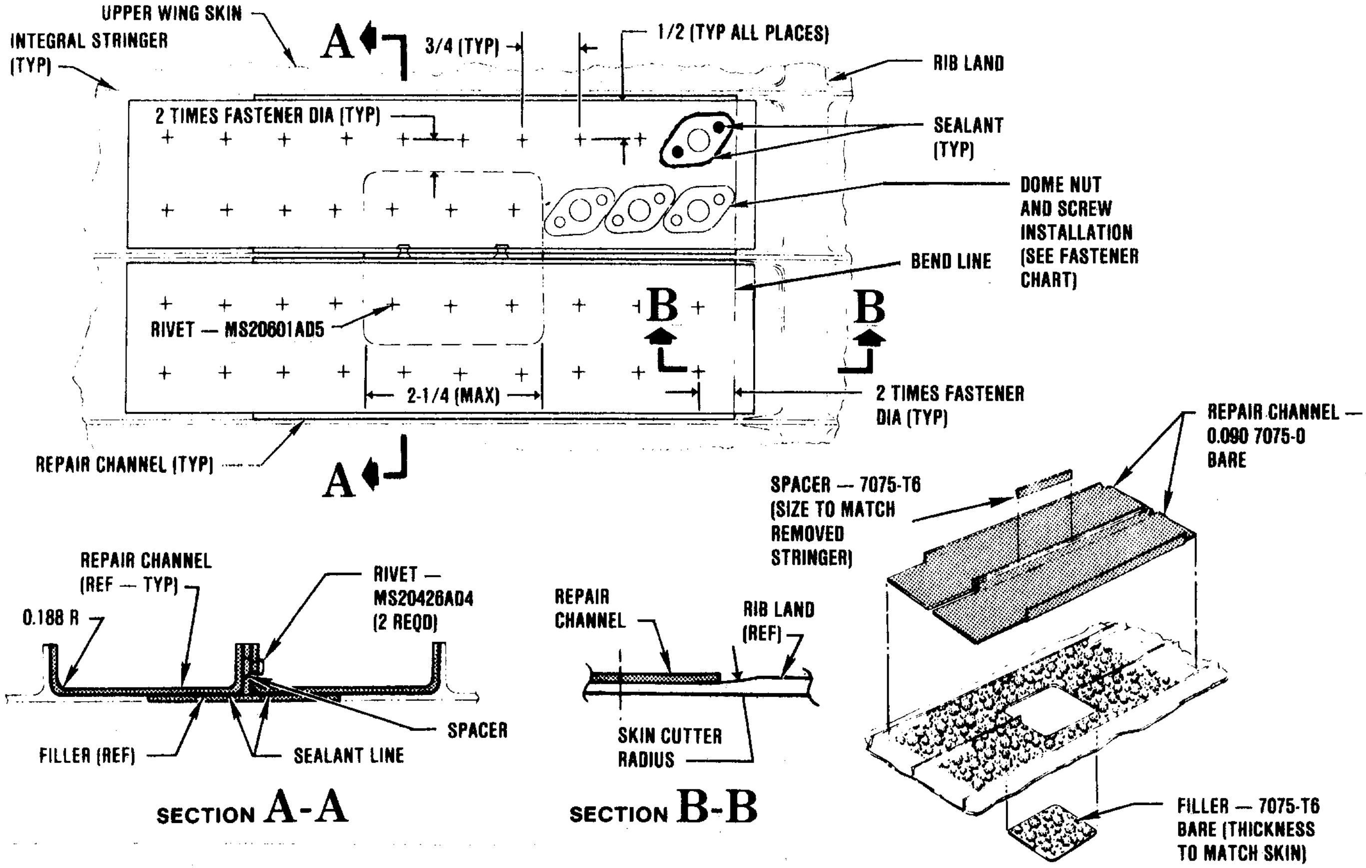
11 Refinish external surfaces of repair to match surrounding area.







Upper Machined Box Skin Land Repair
Figure 206 (Sheet 2 of 2)



1 Trim out damage

2 Measure distance between integral stringers and fabricate repair channels. Channel legs should nest close to stringers.

3 Heat-treat repair channel to T-6 condition.

4 Fabricate spacer and filler.

5 Lay out fastener pattern and drill holes through skin.

6 Install doublers (one at a time) and line-drill skin fastener holes.

7 Drill holes for attaching spacer to one repair channel flange.

8 Install dome nuts on repair channels (when applicable).

9 Temporarily install repair channels and filler. Lay out and drill fastener holes through filler and repair channels.

10 Remove repair parts. Countersink skin and filler.

11 Paint all interior parts.

12 Prepare sealing compound. Seal over dome nut retaining rivets and around dome nut mount (when applicable). Seal all faying surfaces on assembly as instructed in 57-10-30.

13 Refinish exterior areas of repair to match surrounding area.

NOTES

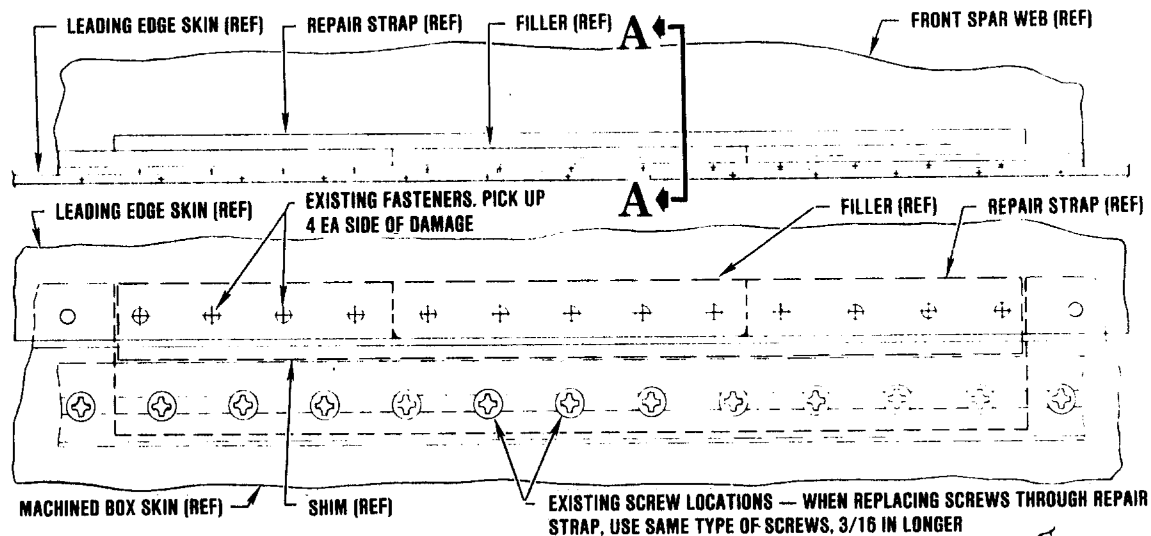
- THIS REPAIR, WITHIN DAMAGE LIMITS SHOWN, IS APPLICABLE TO WING MAIN BOX UPPER SKIN.
- ACCESS MAY BE GAINED BY REMOVING SLAT TRACK CUPS IN FRONT SPAR WHEN ACCESS THROUGH SKIN CUTOUT IS INADEQUATE.

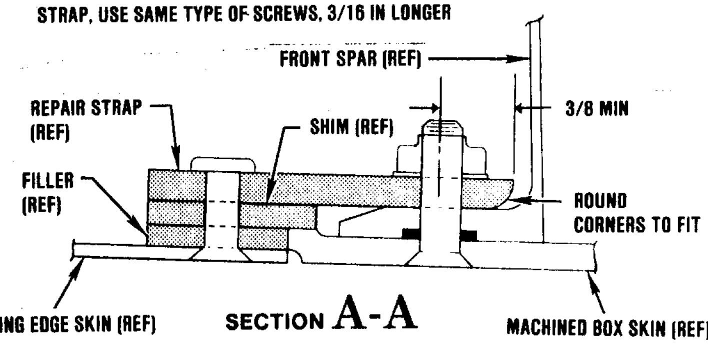
A USE EITHER ESNA A3205-2 OR NUTT SHELL 14633H-O2.

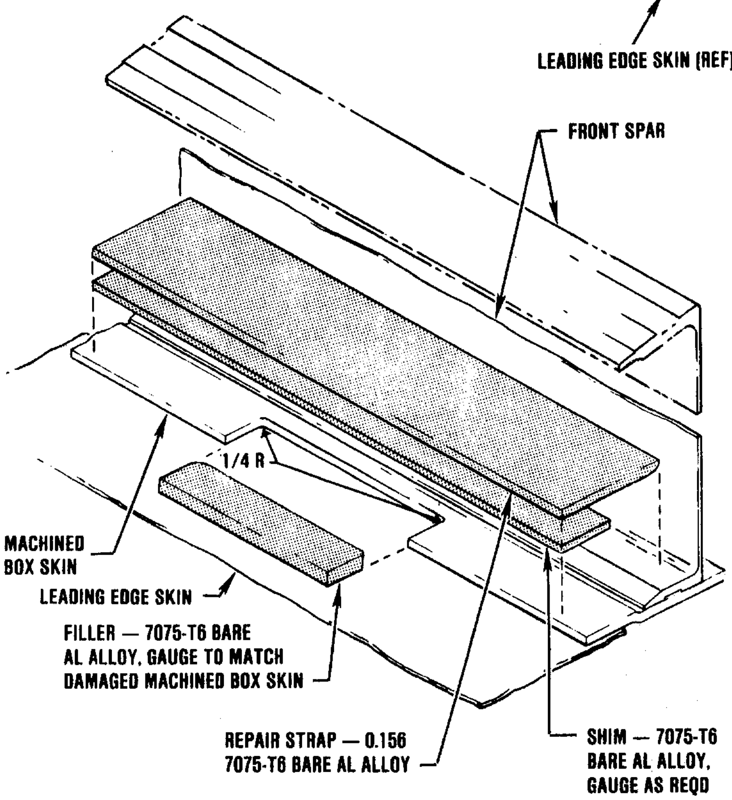
WS	FASTENERS REQD EA SIDE OF DAMAGE THROUGH EA REPAIR CHANNEL	
	7S34-3 SCREW A	F160 JO-BOLT
0 TO 198	6 (MIN)	
198 TO 225		8 (MIN)
225 TO TIP		6 (MIN)

S265-3-264

Upper Machined Box Skin Repair — Blind
Figure 207







1 Trim out damage midway between existing fasteners. Smooth and round all edges and corners.

2 Make filler from material called out, length of cutout in machined box skin.

3 Make repair strap from 0.156 in. 7075-T6 material. Length of repair strap is to equal length of damage plus lengths of areas in which 4 screws are installed on either side of damage. Make shim from 7075-T6 material, length same as length of repair strap and gauge determined by thickness of spar in repair area.

4 Through front spar and machined box skin, remove necessary number of screws to accommodate repair strap.

5 Place repair strap in position, and mark locations of fastener holes.

6 Remove repair strap, and drill fastener holes. This will eliminate the possibility of drill chips entering sealant grooves.

7 Fasten all repair parts, using sizes, types, and lengths of fasteners called out.

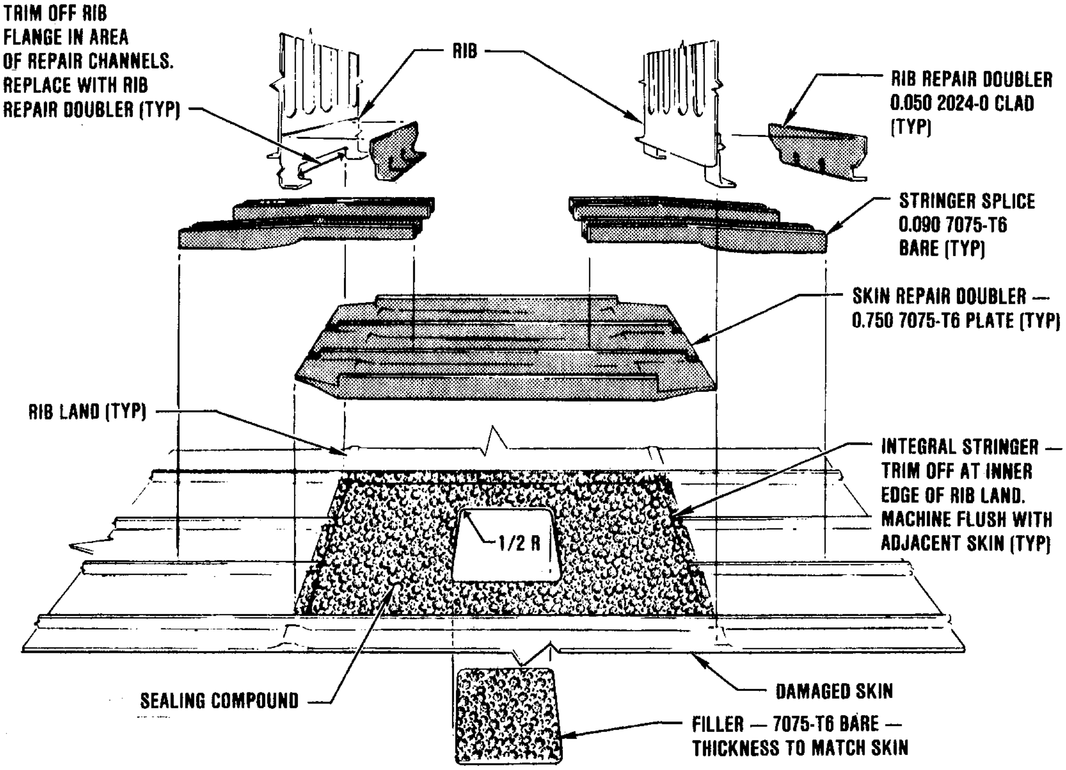
8 In those areas in which screws have been removed and replaced, reseal machined box skin according to instructions in 51-70-30.

NOTE

THIS REPAIR IS LIMITED TO AREAS OUTBD OF WS 65.

S265-3-256

Wing Lower Box Skin Leading Edge Repair
Figure 208



1 Dye-penetrant-check damage to determine extent of cracks.

2 Trim out damage and smooth all edges.

FASTENER CHART

WS	MIN ROWS THRU SKIN AND SKIN REPAIR DOUBLER EA SIDE OF DAMAGE. USE SAME FASTENER IN FILLER.	
	HS47-6	MS20426AD5 OR NAS 1097AD5
12 (CANTED) TO 24 (CANTED)	4	
47 (CANTED) TO 59 (CANTED)	4	
65 (CANTED) TO 198	3	
198 TO TIP		3

NOTES

- THIS REPAIR IS APPLICABLE TO AREAS OF LOWER WING AS STATED IN FASTENER CHART.
- REPARABLE DAMAGE (WITH THIS REPAIR) IS LIMITED TO THREE STRINGER BAYS AND ONE RIB BAY (AS SHOWN).
- REFER TO SHEETS 2 AND 3 FOR FABRICATION AND ASSEMBLY DETAILS.

3 Trim off integral stringers flush with skin as shown.

4 Trim off rib flanges as necessary.

5 Fabricate repair parts.

6 Heat-treat parts made from annealed materials (2024-O to 2024-T42 and 7075-O to 7075-T6).

7 Lay out and drill fastener holes in skin and filler.

8 Position skin repair doubler and line-drill fastener holes through skin and filler.

9 Temporarily secure repair doubler in place and fit and drill stringer splices.

10 Position rib repair doublers on ribs and drill all fastener holes.

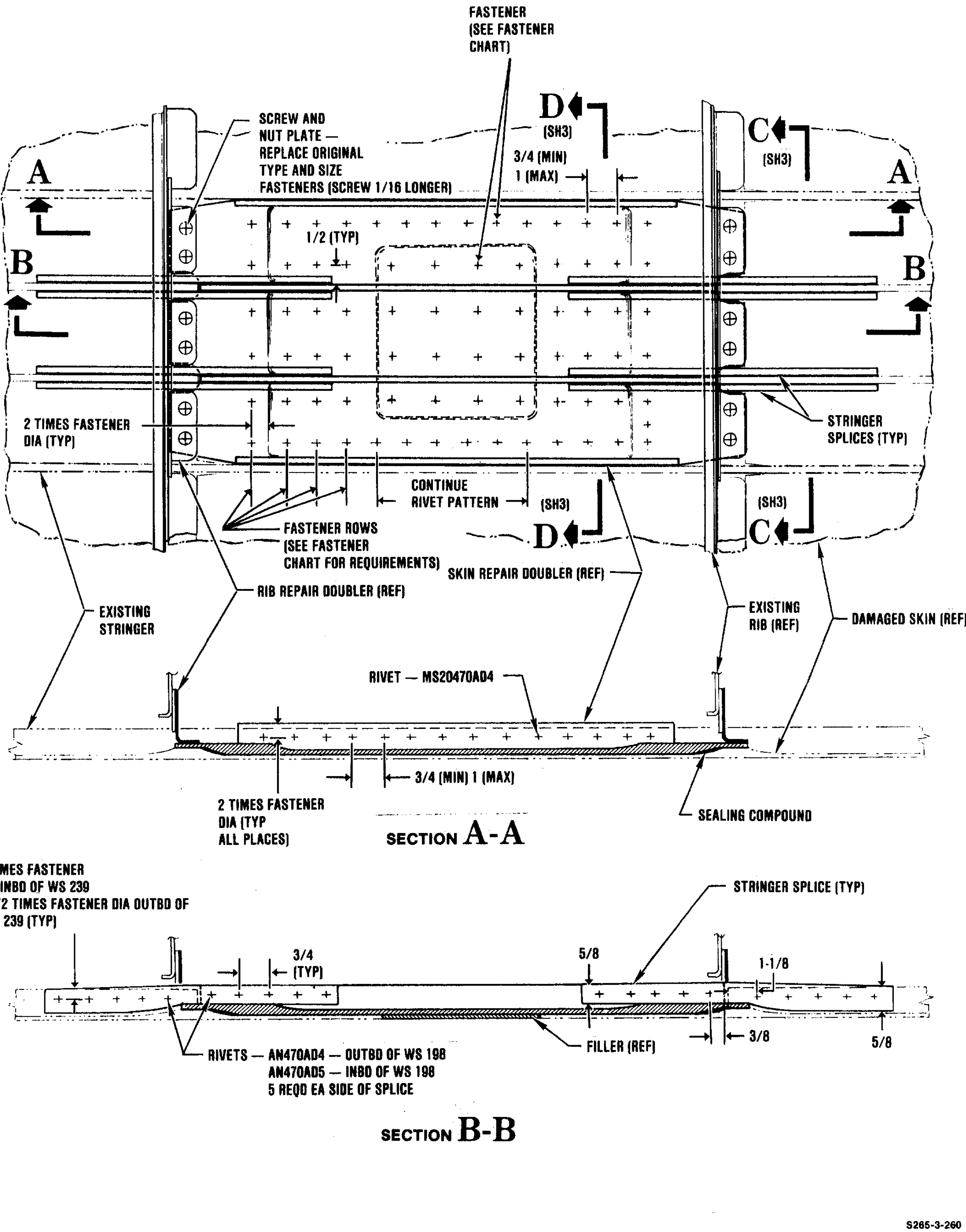
11 Remove all repair parts. Cati-Coat prime repair parts and all bare interior wing areas.

12 Install repair parts and secure as shown. Apply sealant to all faying surfaces between skin and filler, and skin repair doubler. Apply sealant over all rivets after driving (wing interior).

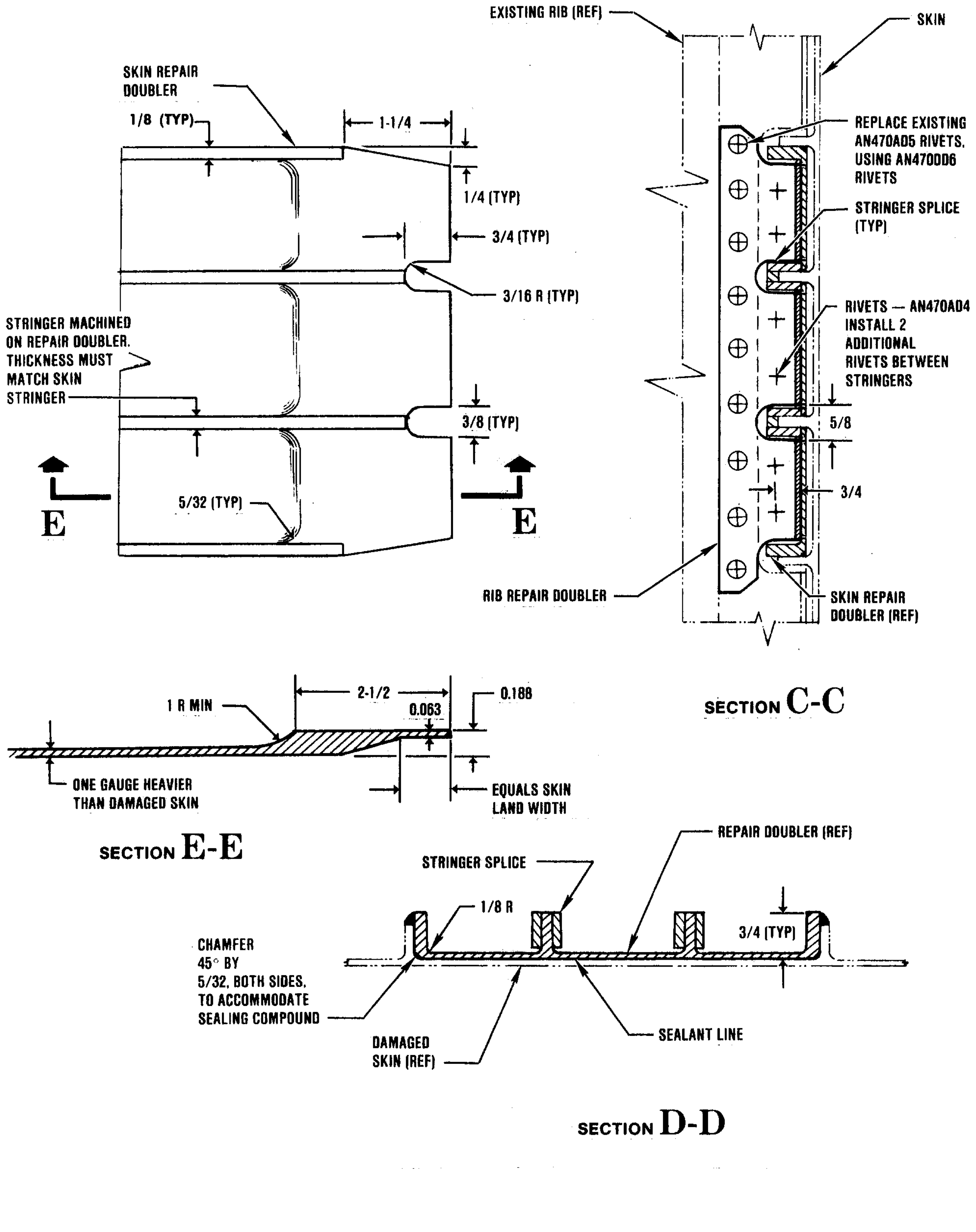
13 Refinish external surface to match surrounding area.

S265-3-259

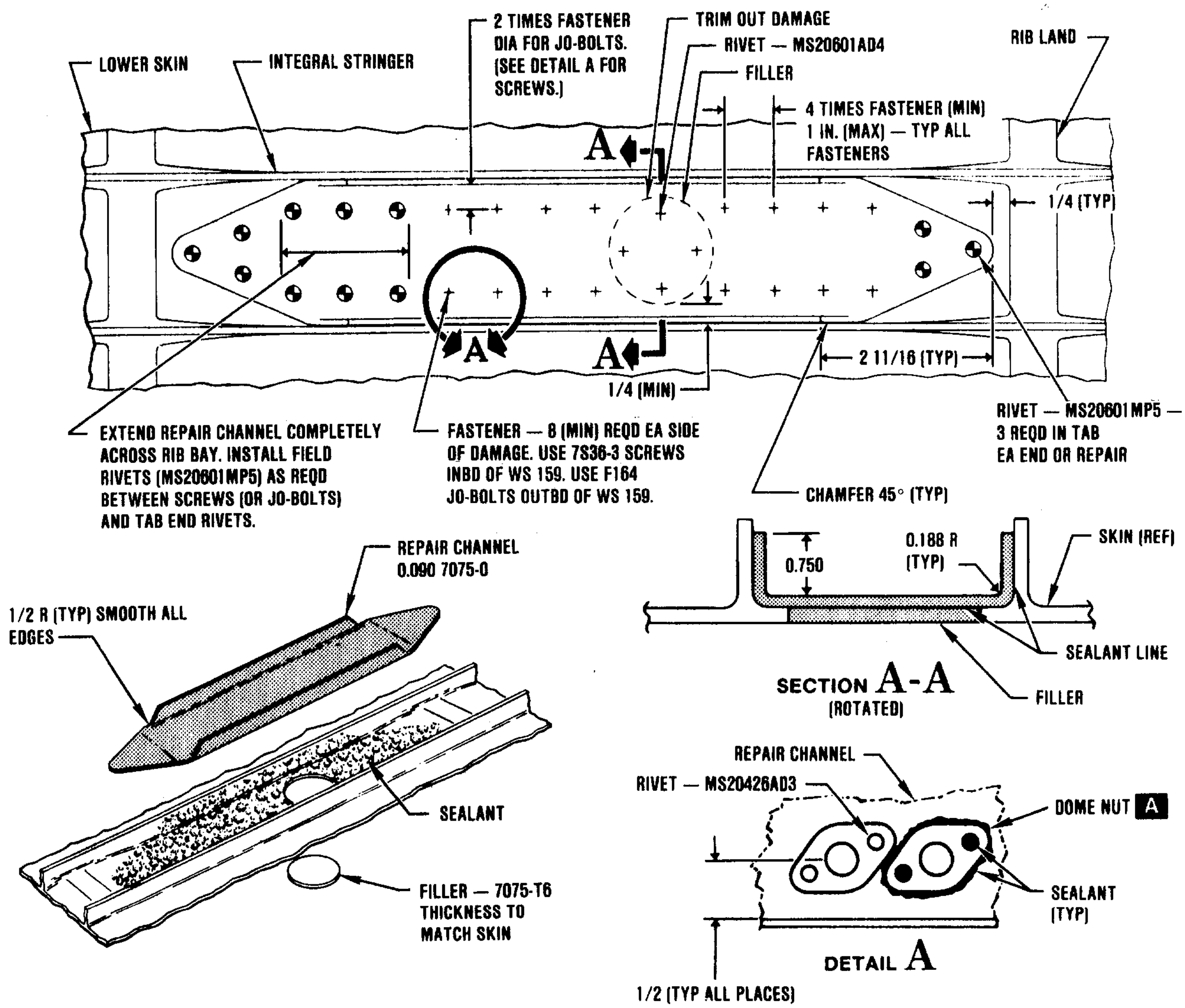
Lower Machined Box Skin Repair
Figure 209 (Sheet 1 of 3)



Lower Machined Box Skin Repair
Figure 209 (Sheet 2 of 3)



Lower Machined Box Skin Repair
Figure 209 (Sheet 3 of 3)



1 Dye-penetrant-check extent of cracks.

2 Trim out damage and smooth edges.

3 Measure distance between integral stringers and fabricate repair channel. Channel legs should nest close to stringers.

4 Heat-treat repair channel to -T6 condition.

5 Fabricate filler.

6 Lay out fastener pattern and drill holes through skin.

7 Install doubler and filler and line-drill fastener holes.

8 Install dome nuts on repair channel (when applicable).

9 Countersink skin and filler.

10 Paint all interior parts.

11 Prepare sealing compound. Seal over dome nut retaining rivets and around dome nut mount (when applicable). Seal all faying surfaces on assembly as instructed in "Sealing Repairs" in this chapter.

12 Refinish exterior areas of repair to match surrounding area.

NOTES

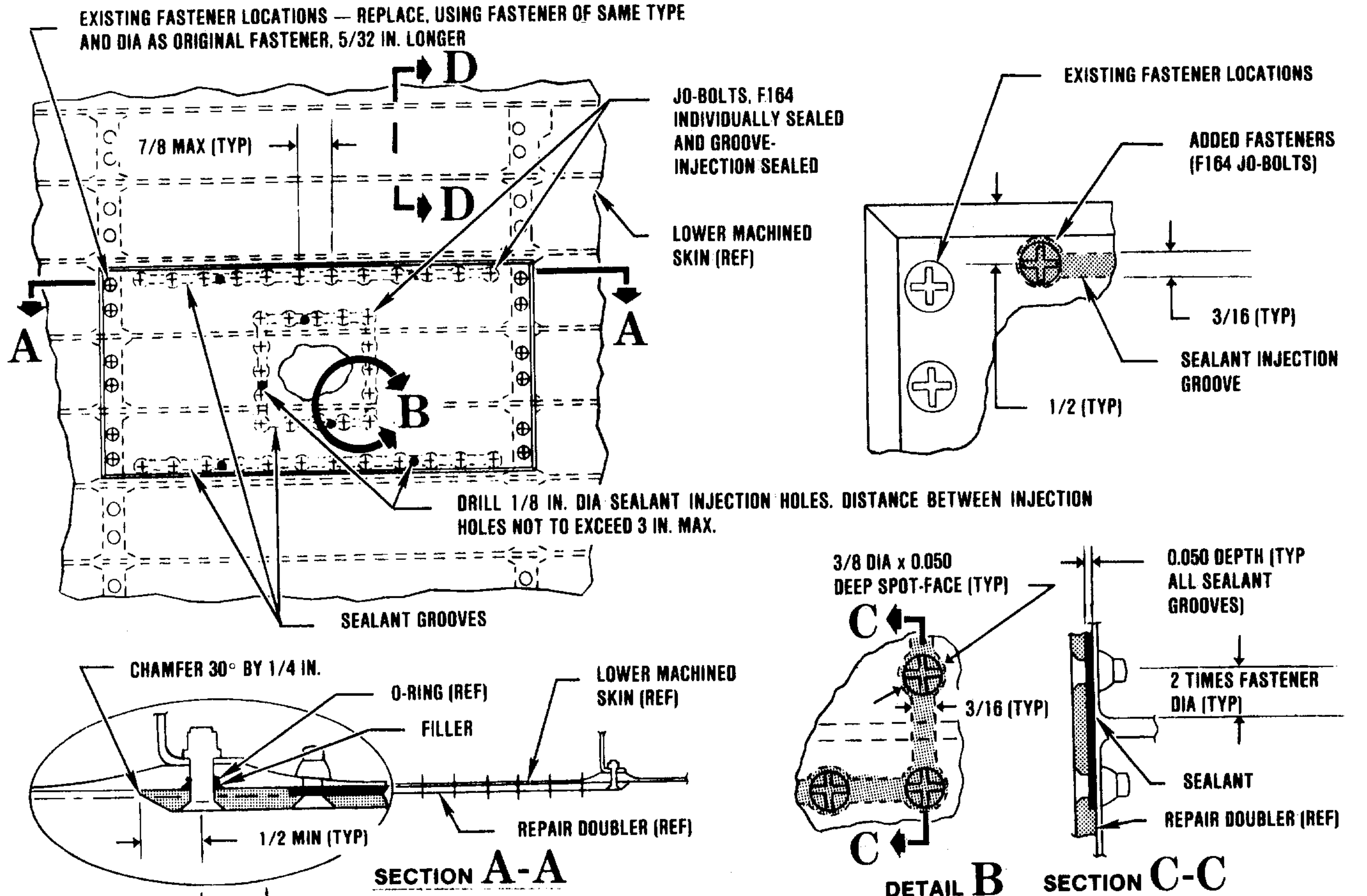
THIS REPAIR, WITHIN DAMAGE LIMITS SHOWN, IS APPLICABLE TO WING MAIN BOX LOWER SKIN.

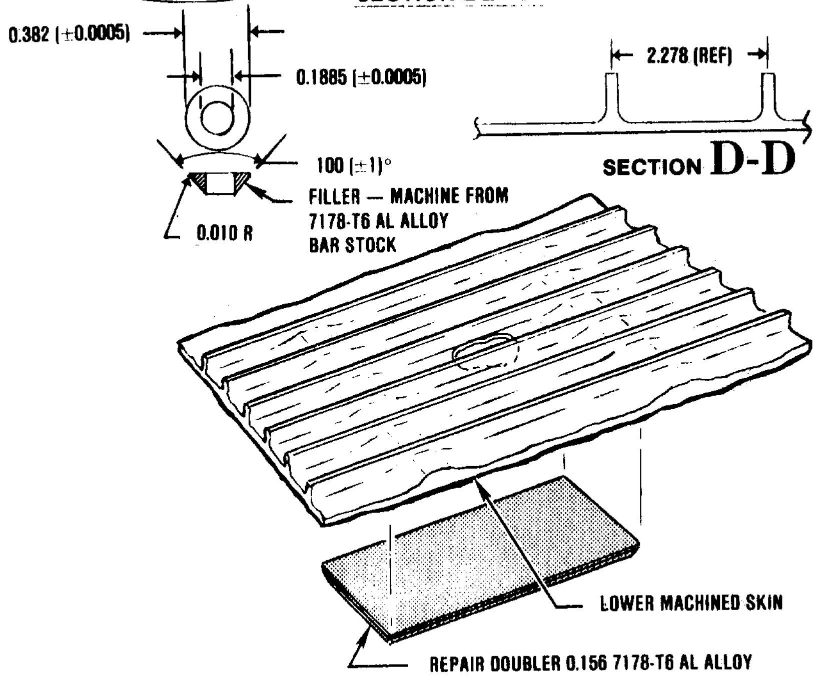
- ACCESS MAY BE GAINED BY REMOVING SLAT TRACK CUPS IN FRONT SPAR.
- A MAX OF TWO REPAIRS MAY BE INSTALLED IN EACH RIB BAY (BETWEEN RIB STATIONS).

A USE EITHER ESNA A3205-2 OR NUTT-SHEL 14633H-02.

S265-3-265

Lower Machined Box Skin Repair — Blind
Figure 210





1 Smooth or trim all rough edges in damaged area. File or grind out all cracks. Using dye-penetrant solution, check whether surrounding area is damaged.

2 Layout repair doubler so that it covers one stringer bay fwd and aft of damaged section, and extends so that it picks up existing fasteners in adjacent ribs on remaining two sides.

3 Machine sealant grooves on inner surface as required. Spot-face an area 3/8 in. in dia by 0.050 in. deep around all fasteners on sealant grooves.

4 Drill 1/8 in. dia sealant injection holes on centerline of machined sealant grooves. Max distance between injection holes must not exceed 3 in.

5 Fabricate fillers for replacement fasteners. Install fillers flush with, to 0.010 in. below surface, existing O-ring sel remaining in place.

6 Install repair doubler, using F164 Jo-Bolts. Seal all jo-bolts as instructed in 51-70-30. Reinstall fasteners through repair doubler and ribs. Use fasteners of same type and dia as removed fasteners, 5/32 in. longer.

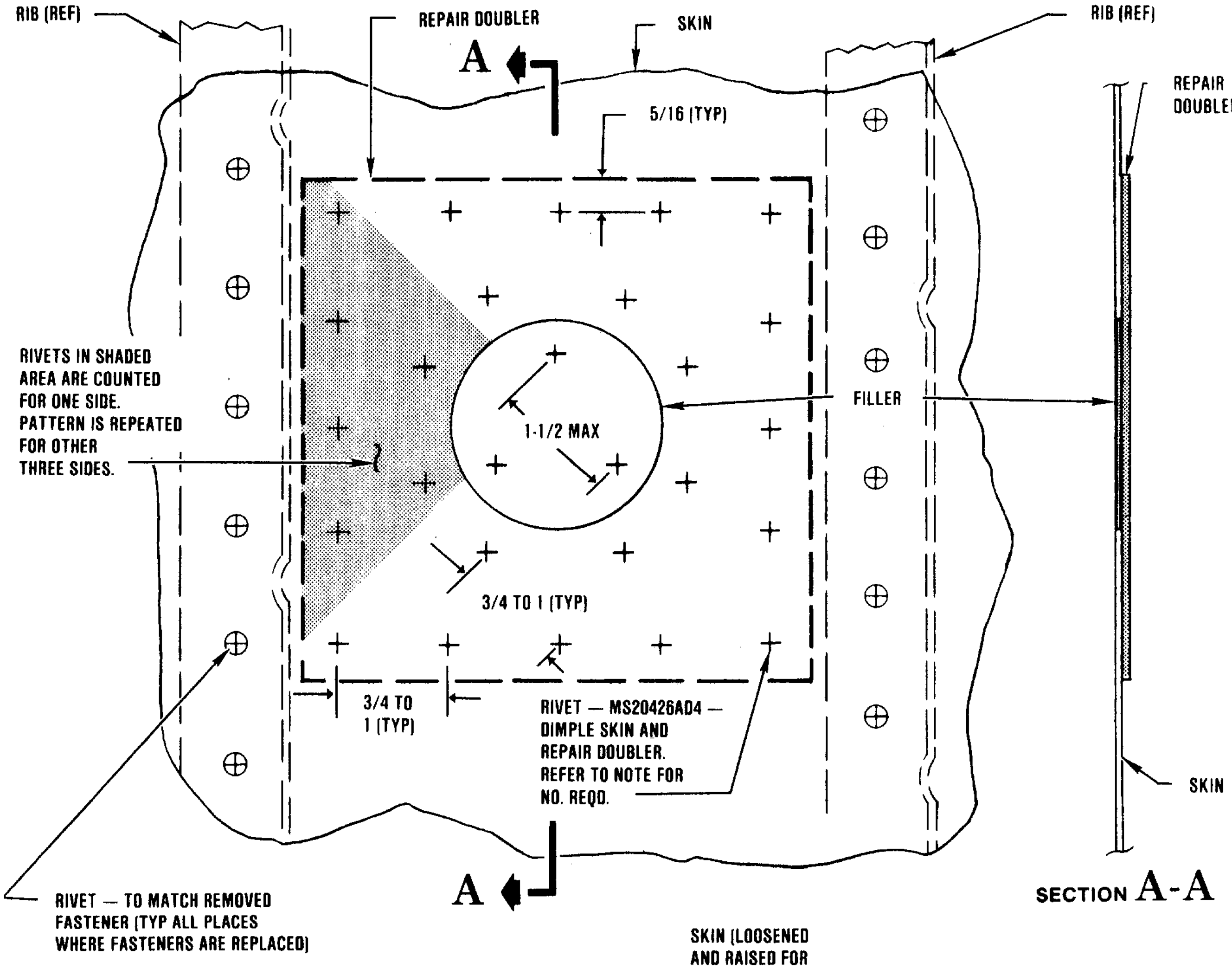
7 Inject sealant into sealant injection holes, and plug holes.

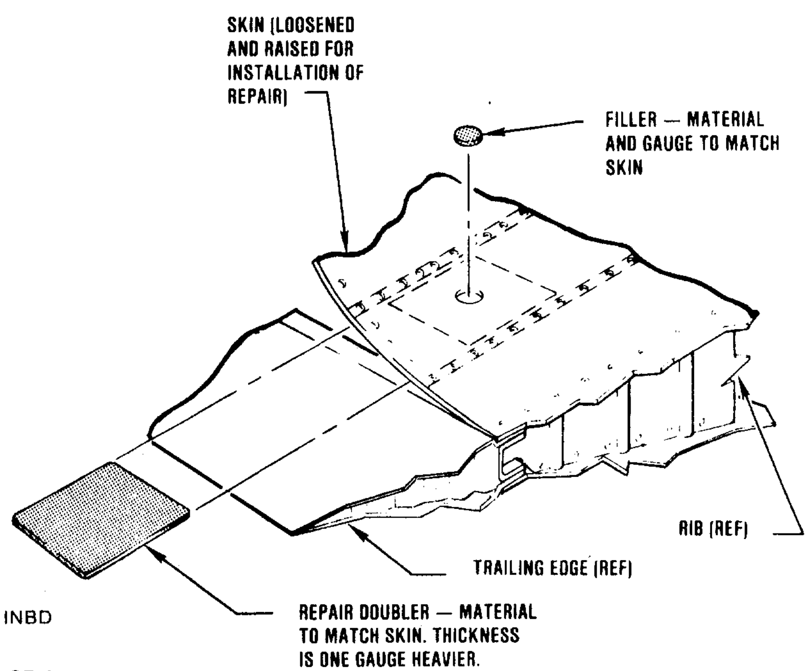
NOTE

IF DAMAGE IS LOCATED INBD OF WS 65.00, REPAIR DOUBLER MUST BE ONE GAUGE HEAVIER THAN GAUGE INDICATED.

S265-3-267

Lower Machined Box Skin Repair — Class B
Figure 211





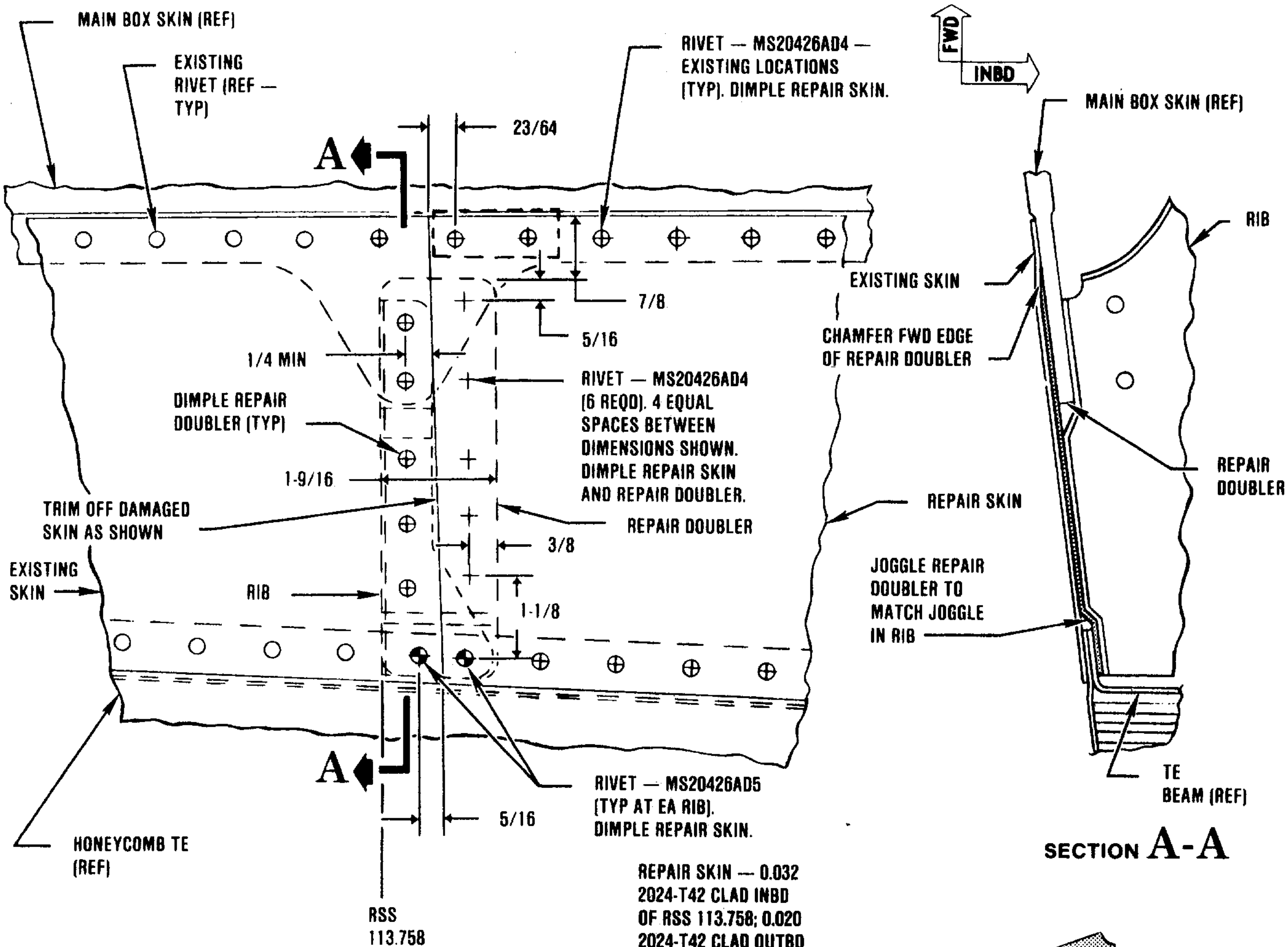
1. Trim out damage.
2. Loosen and raise skin to permit installation of repair.
3. Fabricate and install repair parts.
4. Refasten loosened skin.
5. Refinish repaired skin to match surrounding area.

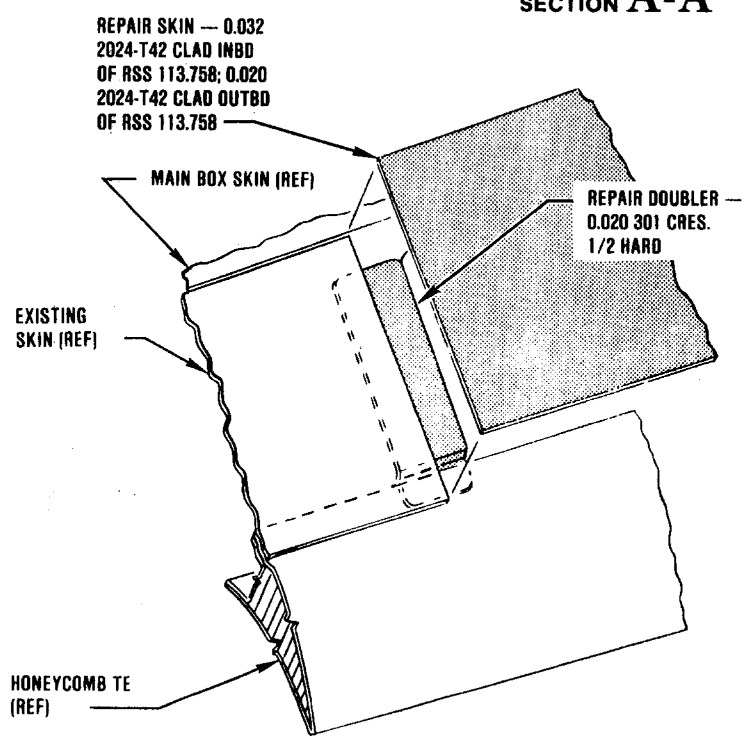
NOTES

- THIS REPAIR IS APPLICABLE TO THE WING INBD TRAILING EDGE (CANTED TES 30.079 TO 51.284).
- FOR NUMBER OF RIVETS REQUIRED ON **EACH OF 4 SIDES** OF REPAIR, MULTIPLY 3.25 BY HOLE DIA. DISTRIBUTE FASTENERS AS SHOWN IN SKETCH.

S265-3-253

Wing Inboard Trialing Edge Skin Repairs
Figure 212





1 Remove inbd skin fasteners and trim off damaged skin as shown

2 Fabricate, prime, and install repair doubler between rib at RSS 113.758 and existing skin

3 Fabricate, prime, and install repair skin

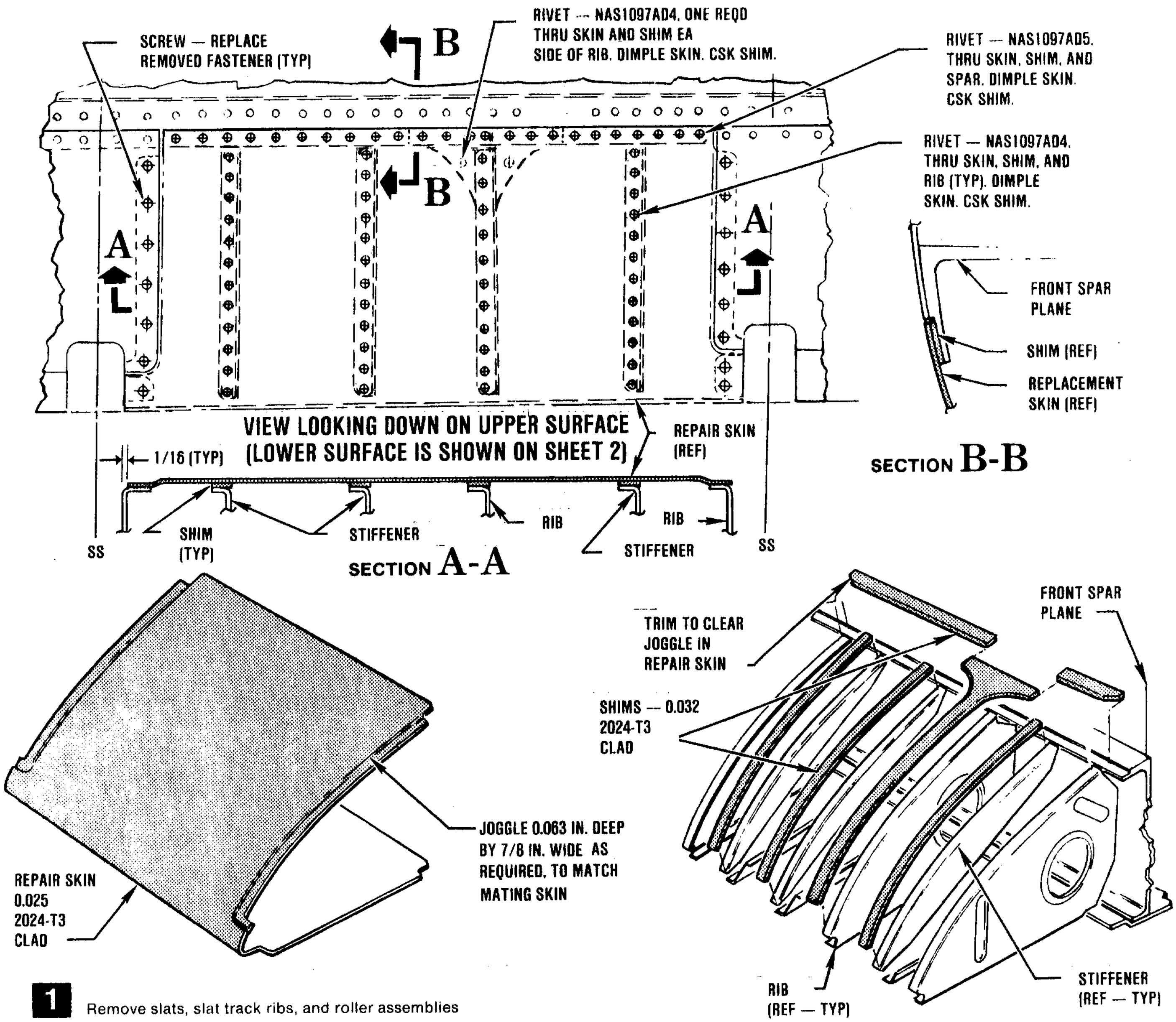
4 Refinish repair to match surrounding area

NOTE

THIS REPAIR IS APPLICABLE, AS SHOWN, TO CRACKED (OR OTHERWISE DAMAGED) WING TRAILING EDGE UPPER SKINS WHEN DAMAGE IS INBD OF RSS 113.758. IT MAY BE ADAPTED TO DAMAGE OUTBD OF RSS 113.758 BY ALTERING SKIN TRIM LINE AS REQUIRED.

S265-3-255

Wing Intermediate Trailing Edge Skin Repair
Figure 213



1 Remove slats, slat track ribs, and roller assemblies as necessary.

2 Trim damage midway between slat track ribs.

3 Repair or replace damaged ribs and stiffeners.

4 Fabricate repair parts.

5 Prime repair parts.

6 Assemble shims to ribs with two 3/32 in. tack rivets per shim.

7 Align repair doublers inside LE skin. Perform drilling, dimpling, and countersinking operations.

8 Rivet repair doublers in place.

9 Align repair skin; drill, dimple, and countersink holes as required.

10 Rivet repair skin in place.

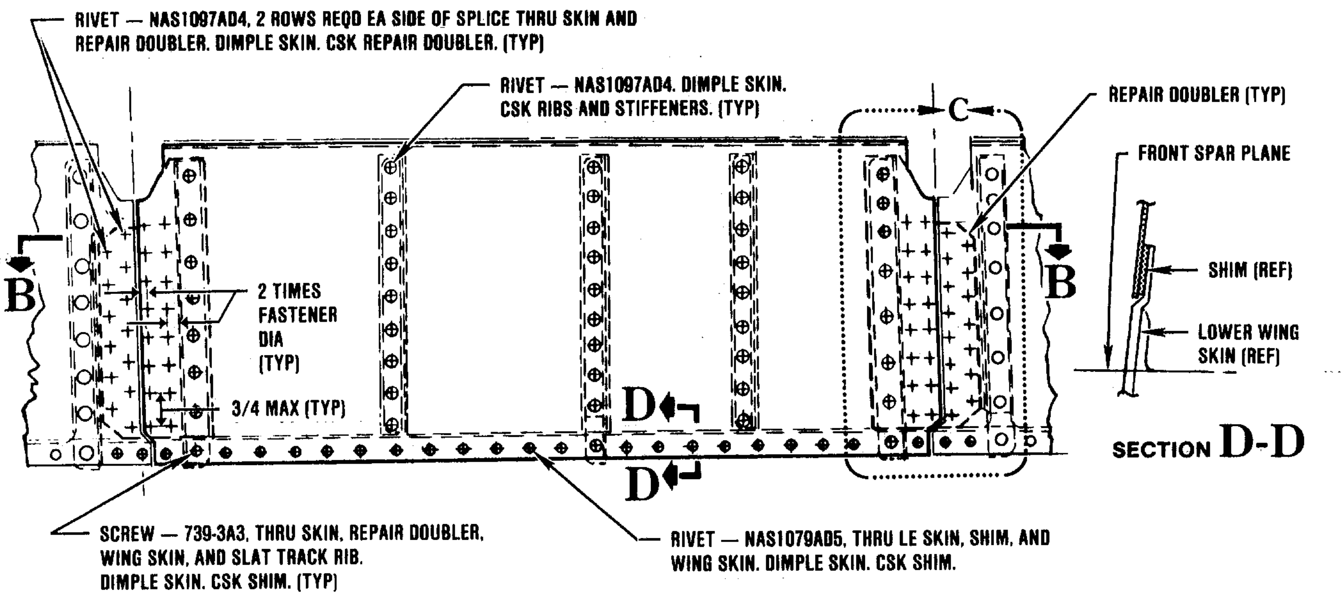
11 Finish repair to match surrounding area.

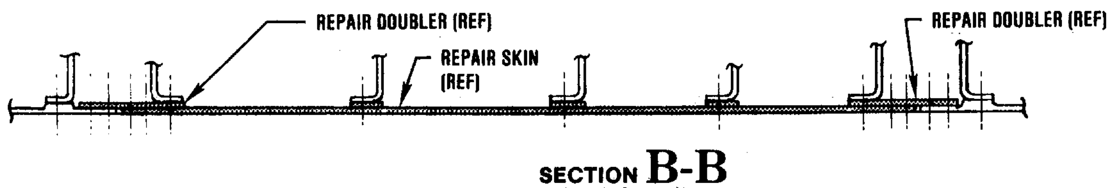
NOTES

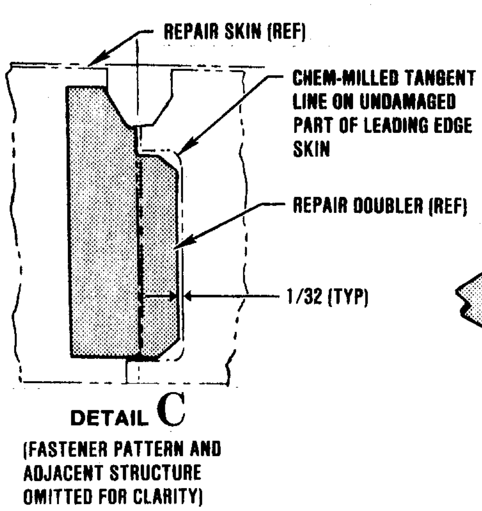
- THIS REPAIR IS APPLICABLE TO ALL UNDERSLAT LEADING EDGE AREAS.
- SEE SHEET 2 FOR DETAILS OF LOWER SIDE OF REPAIR.

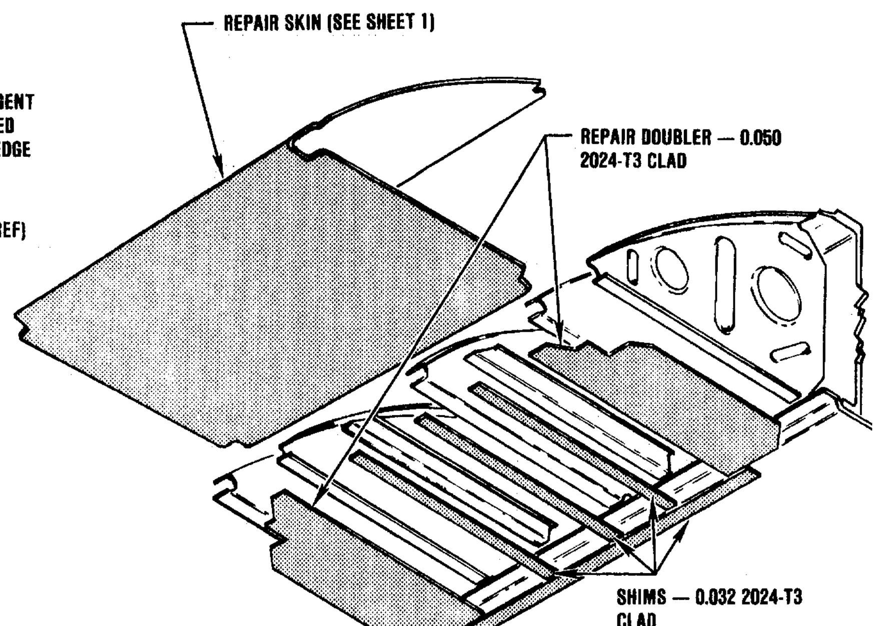
S265-3-251

Wing Underslat Leading Edge Skin Splice Repair
Figure 214 (Sheet 1 of 2)







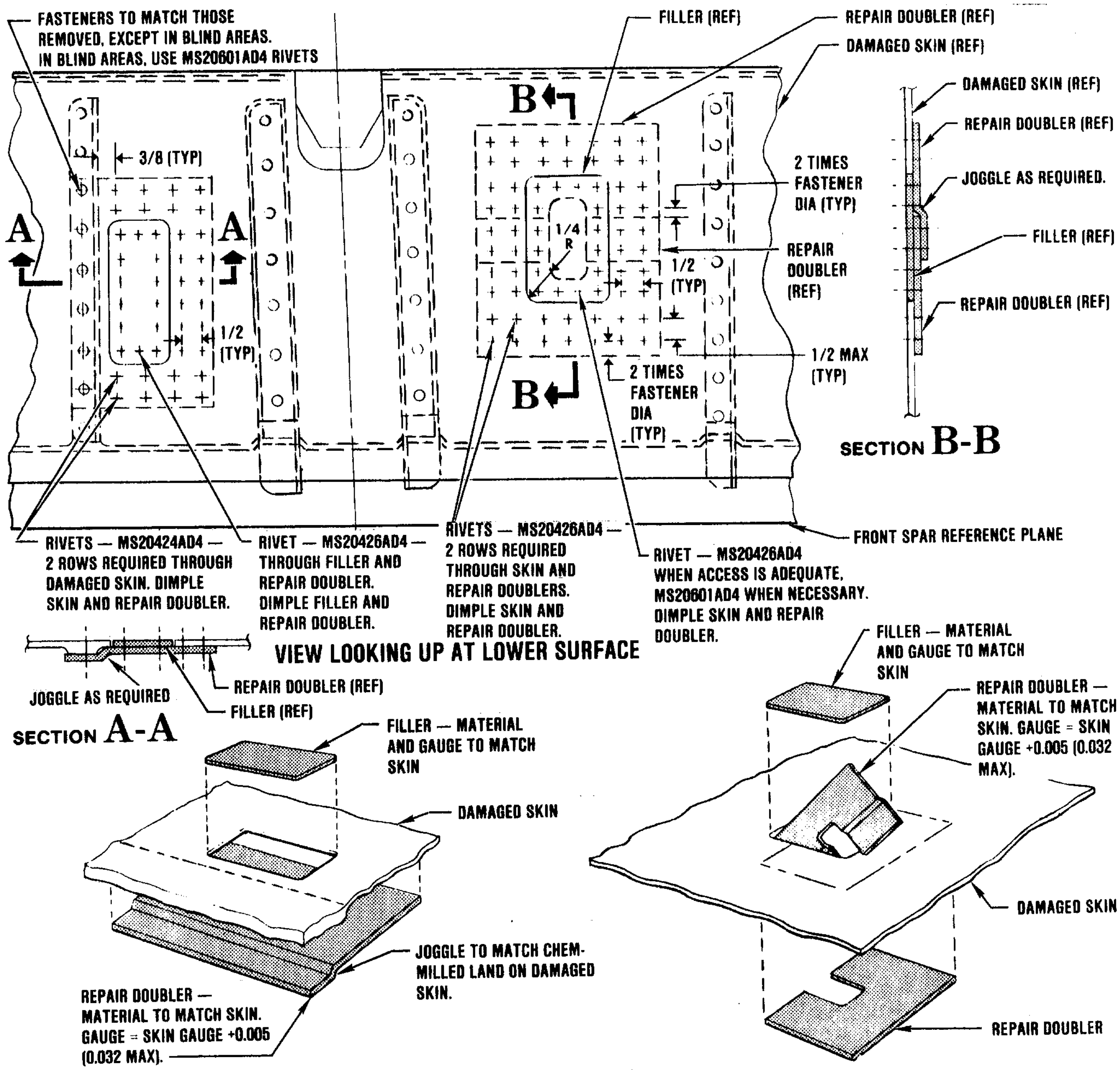


NOTE

REFER TO NOTES AND STEPS ON SHEET 1.

8265-3-252

Wing Underslat Leading Edge Skin Splice Repair
Figure 214 (Sheet 2 of 2)



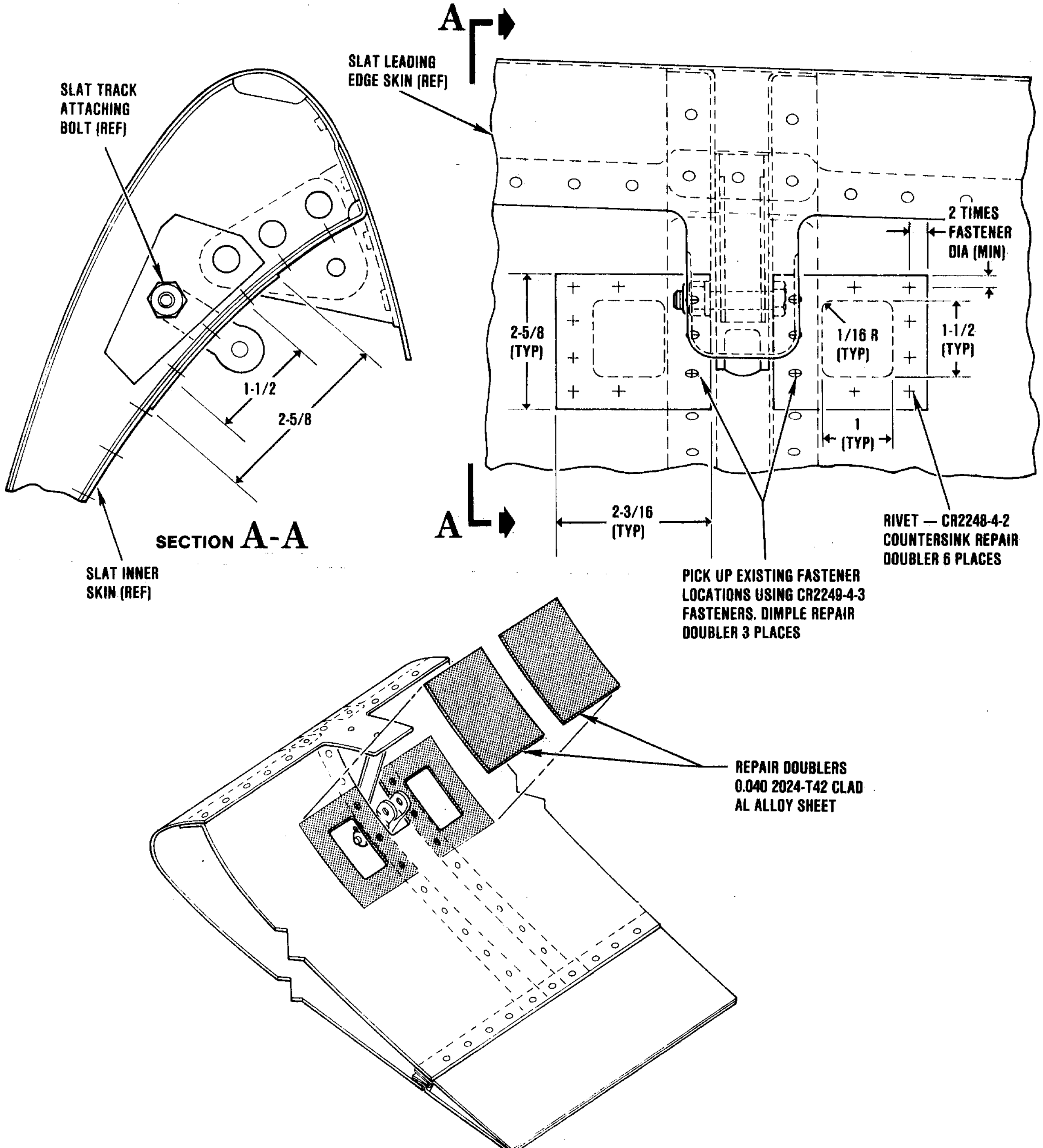
1. Remove slats and slat track ribs and roller assemblies, when necessary for access.
2. Trim out damaged area.
3. Fabricate repair parts.
4. Lay out fastener pattern and drill all parts.
5. Prime repair parts.
6. Assemble and rivet repair parts in place.
7. Refinish repair to match surrounding area.

NOTE

REPAIRS SHOWN ON THIS ILLUSTRATION MAY BE USED TO MAKE REPAIRS ON CHEM-MILLED SKINS ON UNDER-SLAT LEADING EDGE SKINS. REPAIR DOUBLER SHOULD BE MADE OF ONE PIECE WHEN DAMAGED AREA IS ACCESSIBLE THROUGH DOORS AND REMOVABLE RIBS.

S265-3-250

Wing Underslat Leading Edge Skin Repair
Figure 215



1 Make cutouts in slat lower skin adjacent to slat ribs to gain access to slat track attach bolt. Smooth all edges of cutout.

2 Tighten, rework or replace slat track attach bolt as required.

3 Fabricate repair doublers using materials and dimenions shown.

4 Drill out three existing rivets in each rib.

5 Install repair doublers using size and type of fasteners called out.

6 Finish repair to match surrounding area.

S370-3-101

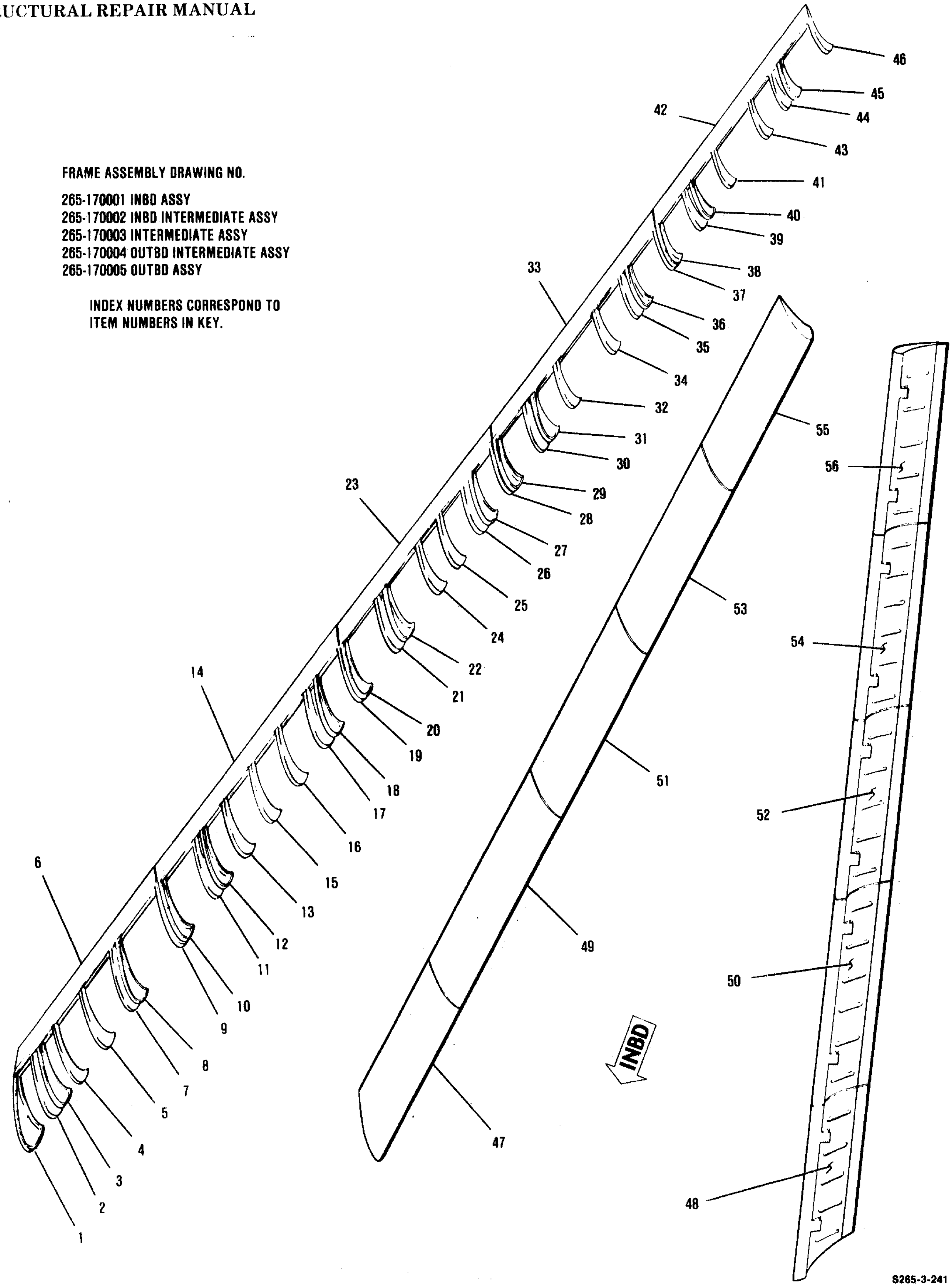
Slat Track Attach Bolt — Access Hole Repair
Figure 216

FLIGHT SURFACES

STRUCTURAL IDENTIFICATION

GENERAL

This section contains the repair indexes for the slats, ailerons, and flaps. See figures 1 through 4.



Wing Slat Repair Index — Model NA 265-40, -60, -70, and -80
Figure 1

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.
1	265-170001-39	Rib — CSS 77.348	2024-T42 Clad	0.032
2	265-170001-13	Rib — SS 74.140	7075-T6 Clad	0.050
3	265-170001-11	Rib — SS 74.890	7075-T6 Clad	0.050
4	265-170001-25	Rib — SS 82.045	7075-T6 Clad	0.020
5	265-170001-9	Rib — SS 90.375	7075-T6 Clad	0.020
6	265-170030	TE — Slat Inbd		
	265-170030-3	Skin	2024-T3 Clad	0.010
	265-170030-5	Core	5052-H39 Honeycomb	3/16 x 0.001
	265-170030-7	Channel	2024-T42	0.020
7	265-170001-7	Rib — SS 96.900	7075-T6 Clad	0.050
8	265-170001-5	Rib — SS 97.636	7075-T6 Clad	0.050
9	265-170001-37	Rib — SS 104.433	2024-T42 Clad	0.032
10	265-170002-5	Rib — SS 105.062	2024-T42 Clad	0.020
11	265-170002-19	Rib — SS 113.952	7075-T6 Clad	0.050
12	265-170002-17	Rib — SS 114.702	7075-T6 Clad	0.050
13	265-170002-15	Rib — SS 121.858	7075-T6 Clad	
14	265-170043	TE — Slat, Inbd Intermediate		
	265-170043-3	Skin	2024-T3 Clad	0.010
	265-170043-5	Core	5052-H39 Honeycomb	3/16 x 0.001
	265-170043-7	Channel	2024-T42	0.020
15	265-170002-13	Rib — SS 129.062	7075-T6 Clad	0.020
16	265-170002-11	Rib — SS 136.265	7075-T6 Clad	0.020
17	265-170002-9	Rib — SS 142.797	7075-T6 Clad	0.050
18	265-170002-7	Rib — SS 143.547	7075-T6 Clad	0.050
19	265-170002-3	Rib — SS 152.406	2024-T42 Clad	0.020
20	265-170003-3	Rib — SS 153.030	2024-T42 Clad	0.020
21	265-170003-15	Rib — SS 161.780	7075-T6 Clad	0.050
22	265-170003-13	Rib — SS 162.530	7075-T6 Clad	0.050
23	265-170053	TE — Slat, Intermediate		
	265-170053-3	Skin	2024-T3 Clad	0.010
	265-170053-5	Core	5052-H39 Honeycomb	3/16 x 0.001
	265-170053-7	Channel	2024-T42	0.020
24	265-170003-17	Rib — SS 169.685	7075-T6 Clad	0.020
25	265-170003-11	Rib — SS 179.578	7075-T6 Clad	0.020
26	265-170003-9	Rib — SS 186.109	7075-T6 Clad	0.050
27	265-170003-7	Rib — SS 18.859	7075-T6 Clad	0.050
28	265-170003-5	Rib — SS 194.539	2024-T42 Clad	0.020
29	265-170004-17	Rib — SS 195.163	2024-T42 Clad	0.020
30	265-170004-15	Rib — SS 202.874	7075-T6 Clad	0.050
31	265-170004-13	Rib — SS 203.624	7075-T6 Clad	0.050
32	265-170004-11	Rib — SS 210.780	7075-T6 Clad	0.020
33	265-170063	TE — Slat, Outbd Intermediate		
	265-170063-3	Skin	2024-T3 Clad	0.010
	265-170063-5	Core	5052-H39 Honeycomb	3/16 x 0.001
	265-170063-7	Channel	2024-T42 Clad	0.020

NOTE

For additional repairs, refer to 57-70-00.

S265-3-241

Key to Figure 1 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

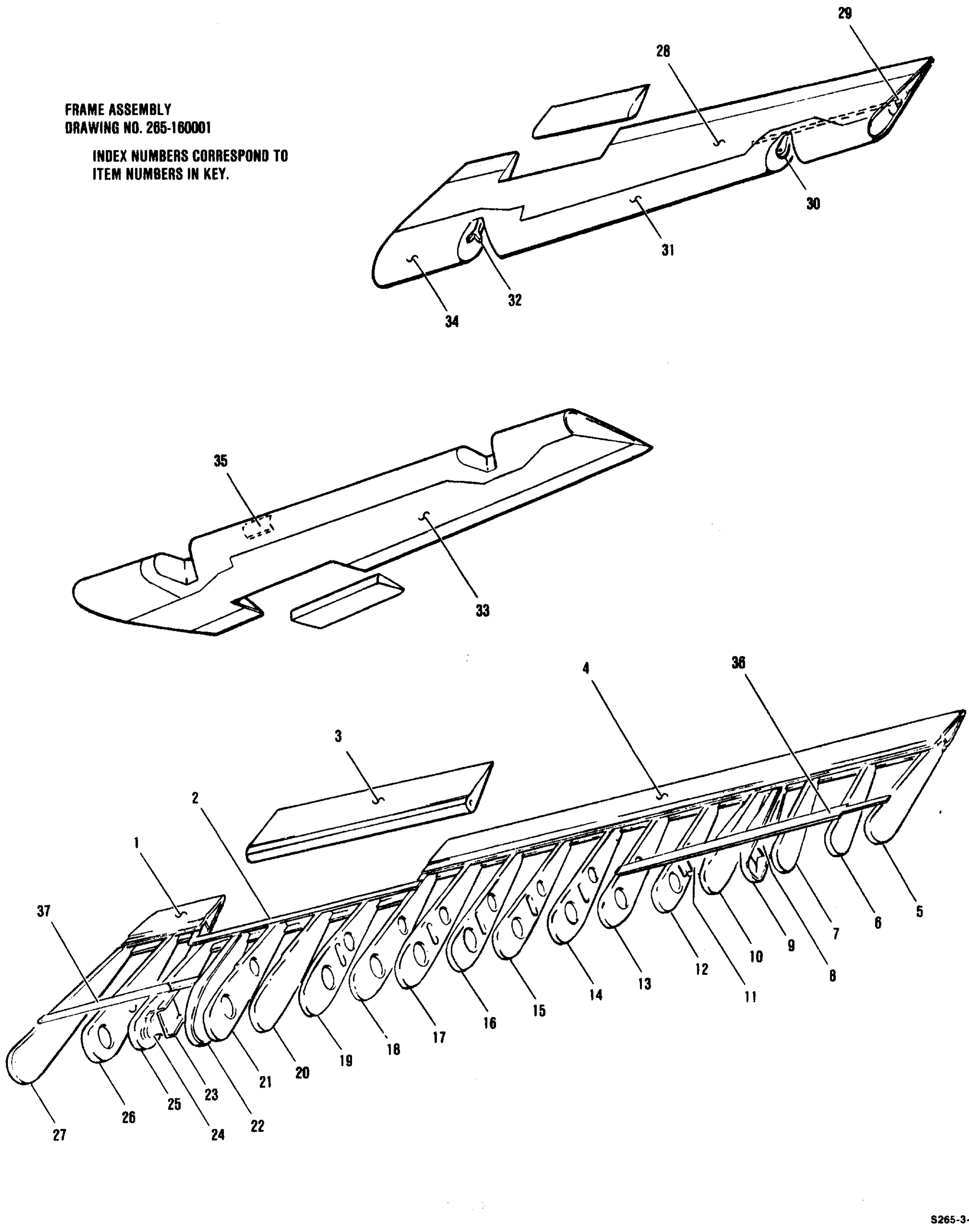
ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
34	265-170004-9	Rib — SS 221.765	7075-T6 Clad	0.020	
35	265-170004-7	Rib — SS 228.297	7075-T6 Clad	0.050	
36	265-170004-5	Rib — SS 229.047	7075-T6 Clad	0.050	
37	265-170004-3	Rib — SS 236.672	2024-T42 Clad	0.020	
38	265-170005-37	Rib — SS 237.296	2024-T42 Clad	0.032	
39	265-170005-7	Rib — SS 244.546	7075-T6 Clad	0.050	
40	265-170005-9	Rib — SS 245.296	7075-T6 Clad	0.050	
41	265-170005-11	Rib — SS 252.451	7075-T6 Clad	0.020	
42	265-170072	TE — Slat, Outbd			
	265-170072-3	Skin	2024-T3 Clad	0.010	
	265-170072-5	Core	5052-H39 Honeycomb	3/16 x 0.001	
	265-170072-7	Channel	2024-T42 Clad	0.020	
43	265-170005-17	Rib — SS 262.141	7075-T6 Clad	0.020	
44	265-170005-13	Rib — SS 268.672	7075-T6 Clad	0.020	
45	265-170005-15	Rib — SS 269.422	7075-T6 Clad	0.050	
46	265-170005-35	Rib — SS 275.874	2024-T42 Clad	0.032	
47	265-170055-1	Skin — Slat, Inbd	2024-T3 Clad	0.040	57-50-20, Fig 212
48	265-170029-1	Skin — Shroud, Inbd Slat	2024-T42 Bare	0.040	57-50-20, Fig 212
49	265-170073-1	Skin — Slat, Inbd Intermediate	2024-T3 Clad	0.040	57-50-20, Fig 212
50	265-170042-1	Skin — Shroud, Inbd Intermediate Slat	2024-T42 Bare	0.040	57-50-20, Fig 212
51	265-170074-1	Skin — Slat, Intermediate	2024-T3 Clad	0.040	57-50-20, Fig 212
52	265-170052-1	Skin — Shroud, Intermediate Slat	2024-T42 Bare	0.040	57-50-20, Fig 212
53	265-170075-1	Skin — Slat, Outbd Intermediate	2024-T3 Clad	0.040	57-50-20, Fig 212
54	265-170062-1	Skin — Shroud, Outbd Intermediate Slat	2024-T42 Bare	0.040	57-50-20, Fig 212
55	265-170076-1	Skin — Slat, Outbd	2024-T3 Clad	0.040	57-50-20, Fig 212
56	265-170071-1	Skin — Shroud, Outbd Slat	2024-T42 Bare	0.040	57-50-20, Fig 212

S265-3-241

NOTE

For additional repairs, refer to 51-70-00.

Key to Figure 1 (Sheet 2 of 2)



Aileron Repair Index
Figure 2

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	246-16003	TE — Aileron			
	246-16003-3	Skin	2024-T3 Clad	0.010	
	246-16003-5	Skin	2024-T3 Clad	0.010	
	246-16003-13	Core	5052-H39 Honeycomb	3/16 x 0.001	
	246-16003-15	Core	5052-H39 Honeycomb	3/16 x 0.001	
	246-16003-9	Channel	2024-T3 Clad	0.020	
	246-16003-7	Channel	2024-T3 Clad	0.020	
2	265-160068 LH Only	Channel	2024-T4 Clad	0.025	
3	265-160003 LH Only	Tab — Aileron Trim			
	265-160003-3	Skin	2024-T3 Clad	0.010	
	265-160003-5	Core	5052-H39 Honeycomb	3/16 x 0.001	
	265-160003-17	Channel	2024-T42 Clad	0.025	
4	246-16003	TE — Aileron			
	246-16003-5	Skin	2024-T3 Clad	0.010	
	246-16003-15	Core	5052-H39 Honeycomb	3/16 x 0.001	
	246-16003-9	Channel	2024-T3 Clad	0.020	
5	246-16520	Rib Assy — CAS 92.802	2024-T4 Clad	0.020	57-50-20, Fig 205
6	265-160037	Rib — AS 86.750	2024-T42 Clad	0.020	57-50-20, Fig 205
7	265-160036	Rib — AS 81.500	7075-T6 Clad	0.040	57-50-20, Fig 205
8	265-160059	Intercostal — AS 75 to 81.500	7075-T6 Clad	0.040	
9	265-160035	Rib Assy — AS 75.500	7075-T6 Clad	0.040	57-50-20, Fig 205
10	265-160034	Rib Assy — AS 74.500	7075-T6 Clad	0.050	57-50-20, Fig 205
11	265-160058	Intercostal — AS 69 1/4 to 75	7075-T6 Clad	0.040	
12	265-160067	Rib — AS 69.250	7075-T6 Clad	0.063	57-50-20, Fig 205
13	265-160033	Rib — AS 64.000	2024-T42 Clad	0.020	57-50-20, Fig 205
14	265-160032	Rib — AS 58.750	2024-T42 Clad	0.020	57-50-20, Fig 205
15	265-160031	Rib — AS 53.500	2024-T42 Clad	0.020	57-50-20, Fig 205
16	265-160030	Rib — AS 48.250	2024-T42 Clad	0.020	57-50-20, Fig 205
17	265-160029	Rib — AS 43.000	2024-T42 Clad	0.020	57-50-20, Fig 205
18	265-160028	Rib — AS 37.750	2024-T42 Clad	0.020	57-50-20, Fig 205
19	265-160027	Rib — AS 32.500	2024-T42 Clad	0.020	57-50-20, Fig 205
20	265-160026	Rib — AS 27.250	7075-T6 Clad	0.032	57-50-20, Fig 205
21	265-160025	Rib — AS 22.678	7075-T6 Clad	0.025	57-50-20, Fig 205
22	265-160024	Rib Assy — AS 17.500	7075-T6 Clad	0.063	57-50-20, Fig 205
23	265-160041	Rib — AS 13.594	2024-T42 Clad	0.032	57-50-20, Fig 205
24	265-160040 LH Only	Support — AS 13.094	7178-T6 Al Aly Bar		
25	265-160023 LH Only	Rib — CAS 12.625	7075-T6 Clad	0.050	57-50-20, Fig 205

NOTE

For additional repairs, refer to 51-70-00.

8265-3-242

Key to Figure 2 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
26	265-160021	Rib Assy — CAS 8.500	7075-T6 Clad	0.025	57-50-20, Fig 205
27	265-160022 LH Only	Rib Assy — CAS 1.000	2024-T42 Clad	0.020	57-50-20, Fig 205
28	265-160002-3	Skin — Aileron Upper	2024-T3 Clad	0.020	57-50-20, Fig 207
	265-160002-9	Skin	2024-T3 Clad	0.020	
29	246-16548	Pin Assy — Aileron Outbd Hinge			
30	246-16031	Link — Aileron Outbd Hinge Assy	4130 Steel Bar	1.000	
31	265-160061	Skin — Aileron LE	7075-T6 Clad	0.090 A	57-50-20, Fig 206
32	265-16530	Link — Aileron Inbd Hinge	7075-T6 Al Aly Bar	2-3/16	
33	265-160002-5	Skin — Aileron Lower	2024-T3 Clad	0.020	57-50-20, Fig 207
34	265-160002-7	Skin — Aileron LE	2024-T3 Clad	0.020	
35	265-160073-3 Thru -11 and -15	Weight	1018 Stl Bar	1/2	
	265-160073-13 and -17	Weight	1010 Stl Sh	1/8	
	265-160073-19 Thru -25	Weight	301 CRES Sh	0.190	
36	246-16511	Stringer — Aileron Outbd	7075-T6 Al Aly Plate	3/8	
37	265-160049	Channel — CAS 0 to 12-5/8	2024-T42 Clad	0.032	

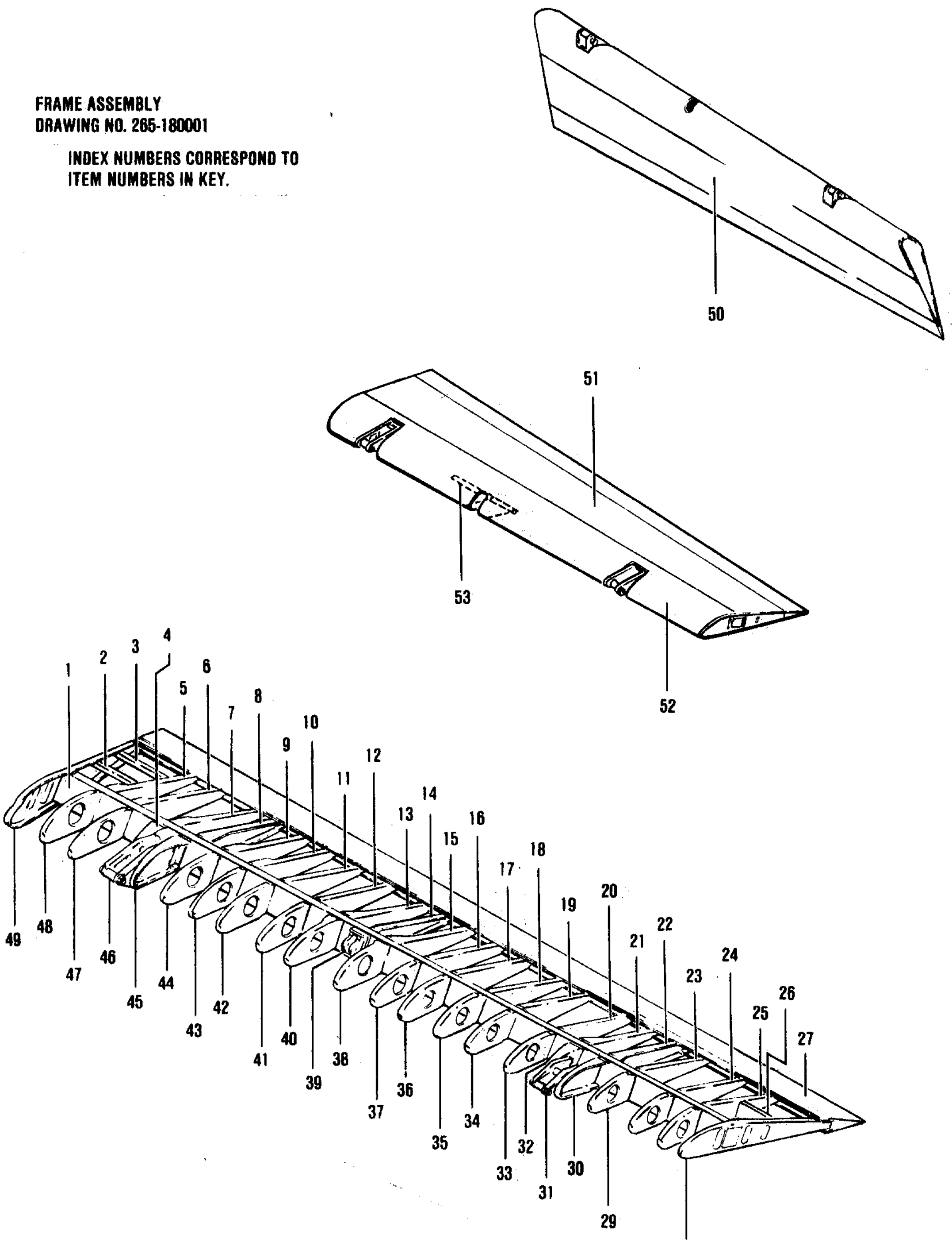
NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

S265-3-242

Key to Figure 2 (Sheet 2 of 2)



Flap Repair Index — Model 265-40, -60, -70, and -80
Figure 3

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	265-180002-11	Spar, Flap Front	7075-T6 Clad	0.063	
2	265-180001-5	Stringer	2024-T42 Clad	0.025	
3	265-180001-7	Stringer	2024-T42 Clad	0.025	
4	265-180036	Rib — LE, FS 84.769	7075-T6 Clad	0.071	57-50-20, Fig 210
5	265-180046	Rib — TE, FS 73.769	7075-T6 Clad	0.020	
6	265-180047	Rib — TE, FS 79.269	7075-T6 Clad	0.020	57-50-20, Fig 210
7	265-180048	Rib — TE, FS 84.769	7075-T6 Clad	0.050	57-50-20, Fig 210
8	265-180049	Rib — TE, FS 87.393	7075-T6 Clad	0.071 A	57-50-20, Fig 210
9	265-180052	Rib — TE, FS 92.233	7075-T6 Clad	0.020	57-50-20, Fig 210
10	265-180053	Rib — TE, FS 97.074	7075-T6 Clad	0.020	57-50-20, Fig 210
11	265-180054	Rib — TE, FS 101.914	7075-T6 Clad	0.020	57-50-20, Fig 210
12	265-180055	Rib — TE, FS 106.774	7075-T6 Clad	0.020	57-50-20, Fig 210
13	265-180056	Rib — TE, FS 111.974	7075-T6 Clad	0.063	57-50-20, Fig 210
14	265-180057	Rib — TE, FS 114.344	7075-T6 Clad	0.063	57-50-20, Fig 210
15	265-180059	Rib — TE, FS 118.640	7075-T6 Clad	0.063	57-50-20, Fig 210
16	265-180060	Rib — TE, FS 123.840	7075-T6 Clad	0.020	57-50-20, Fig 210
17	265-180061	Rib — TE, FS 128.846	7075-T6 Clad	0.020	57-50-20, Fig 210
18	265-180062	Rib — TE, FS 133.802	7075-T6 Clad	0.020	57-50-20, Fig 210
19	265-180063	Rib — TE, FS 138.757	7075-T6 Clad	0.020	57-50-20, Fig 210
20	265-180064	Rib — TE, FS 143.713	7075-T6 Clad	0.020	57-50-20, Fig 210
21	265-180065	Rib — TE, FS 148.756	7075-T6 Clad	0.040	57-50-20, Fig 210
22	265-180066	Rib — TE, FS 151.381	7075-T6 Clad	0.071 A	57-50-20, Fig 210
23	265-180067	Rib — TE, FS 156.881	7075-T6 Clad	0.020	57-50-20, Fig 210
24	265-180034	Rib — FS 162.381	7075-T6 Clad	0.020	57-50-20, Fig 210
25	265-180035	Rib — FS 167.881	7075-T6 Clad	0.020	
26	265-180001-3	Stringer	2024-T42 Clad	0.025	
27	265-180071	TE — Flap			
	265-180071-3	Skin	2024-T3 Clad	0.010	
	265-180071-5	Core	5052-H39 Honeycomb	3/16 x 0.001	
	265-180071-7	Channel	2024-T3 Clad	0.020	
28	265-180021	Rib — Flap DCS 171.345	2024-T42 Clad	0.020	
29	265-180033	Rib — LE, FS 156.881	7075-T6 Clad	0.020	
30	265-180044	Rib Assy — LE, FS 151.381	7075-T6 Clad	0.071	
31	265-180085	Roller Assy — Flap Outbd Track			
32	265-180042	Rib — LE, FS 148.756	7075-T6 Clad	0.071	
33	265-180032	Rib — LE, FS 143.713	7075-T6 Clad	0.020	
34	265-180031	Rib — LE, FS 138.757	7075-T6 Clad	0.020	
35	265-180030	Rib — LE, FS 133.802	7075-T6 Clad	0.020	
36	265-180029	Rib — LE, FS 128.846	7075-T6 Clad	0.020	
37	265-180028	Rib — LE, FS 123.840	7075-T6 Clad	0.020	
38	265-180041	Rib — LE, FS 118.640	7075-T6 Clad	0.063	
39	265-180089	Support — Flap Actuator Attach Fwd	2024-T42 Al Aly Bar	2.000	
40	265-180040	Rib — LE, FS 111.974	7075-T6 Clad	0.063	
41	265-180027	Rib — LE, FS 106.774	7075-T6 Clad	0.020	
42	265-180026	Rib — LE, FS 101.914	7075-T6 Clad	0.020	
43	265-180025	Rib — LE, FS 97.074	7075-T6 Clad	0.020	
44	265-180024	Rib — LE, FS 92.233	7075-T6 Clad	0.020	
45	265-180038	Rib Assy — LE, FS 87.393	7075-T6 Clad	0.071	

NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

S265-3-243

Key to Figure 3 (Sheet 1 of 2)

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
46	265-180076	Roller Assy — Flap Inbd Track			
47	265-180023	Rib — LE, FS 79.269	7075-T6 Clad	0.020	
48	265-180022	Rib — LE, FS 73.769	7075-T6 Clad	0.020	
49	265-180020	Rib — DCCS 68.336	2024-T42 Clad	0.020	
50	265-180069	Skin — Flap, Lower	2024-T3 Clad	0.040 A	51-50-20, Fig 209
51	265-180068	Skin — Flap, Upper	2024-T3 Clad	0.040 A	51-50-20, Fig 209
52	265-180070	Skin — LE Flap	7075-T651 Bare	0.250 A	
53	265-180081	Support — Skin, LE Flap	7075-T6 Bare	1/4	

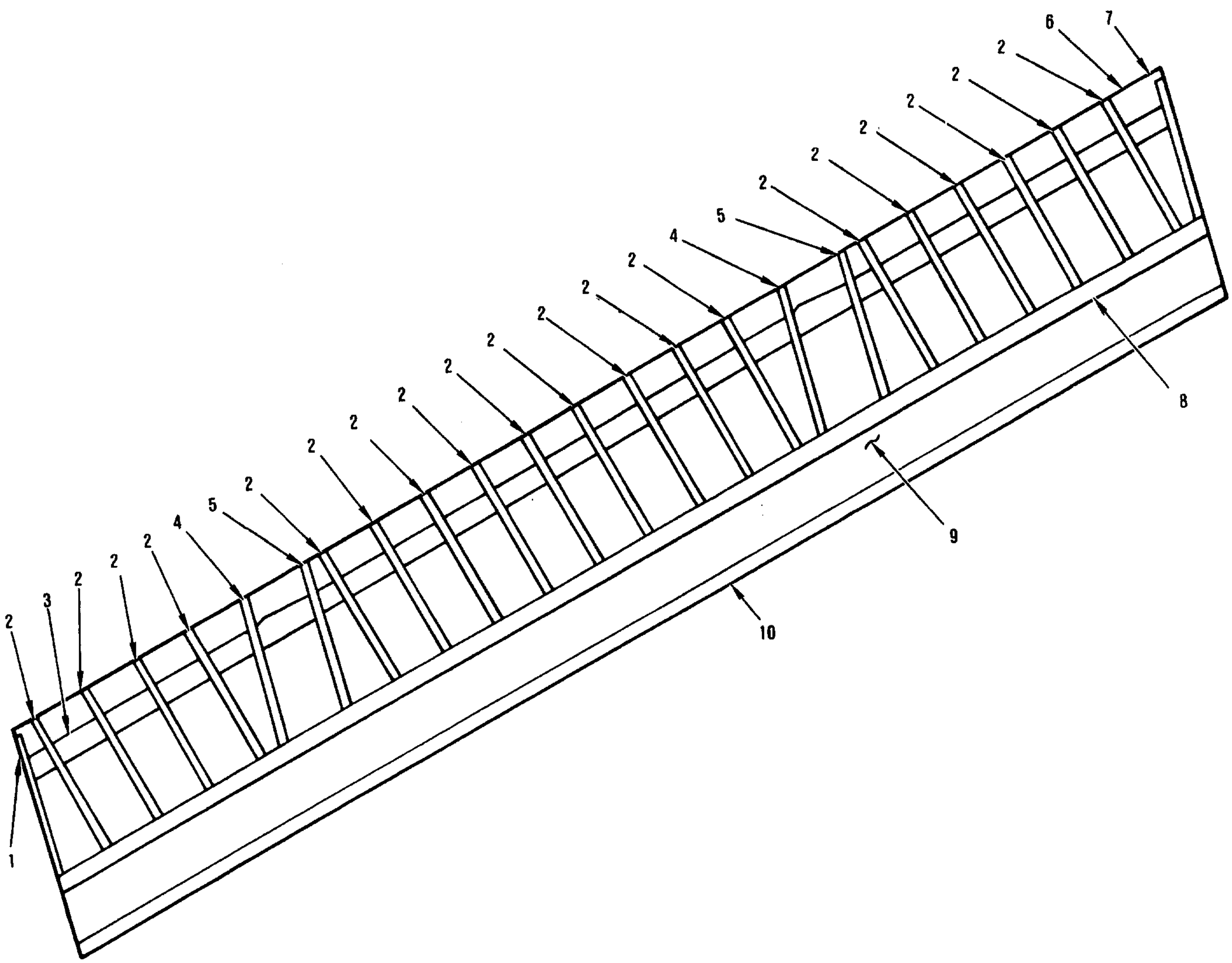
NOTES

- For additional repairs, refer to 51-70-00.

A This is a chem-milled part. Measure thinned areas or refer to applicable drawing numbers for thickness variation.

S265-3-243

Key to Figure 3 (Sheet 2 of 2)



Flap Repair Index —
Model NA 265-60A, -60SC, -65, -80A, and -80SC
Figure 4

STRUCTURAL IDENTIFICATION (Continued)

ITEM NO.	DRAWING NO.	DESCRIPTION	MATERIAL	GAUGE OR EXTRUSION NO.	REPAIR FIGURE NO.
1	76-57604-013	Rib	2024-T42 Clad	0.032	
2	76-57604-009	Rib	2024-T42 Clad	0.032	
3	76-57604-079	Channel	2024-T42 Clad	0.063	
4	76-57604-041	Rib	2024-T42 Clad	0.063	
5	76-57604-065	Rib	2024-T42 Clad	0.063	
6	76-57604-003	LE Skin	2024-T42 Clad	0.040	
7	76-57604-063	Rib	2024-T42 Clad	0.032	
8	76-57604-015	Channel	2024-T42 Clad	0.063	
9	76-57604-005	Skin, Upper	2024-T3 Clad	0.040	57-50-20, Fig 209
10	76-57604-007	Skin, Lower	2024-T3 Clad	0.040	57-50-20, Fig 209

Key to Figure 4

FLIGHT SURFACES

ALLOWABLE DAMAGE

GENERAL

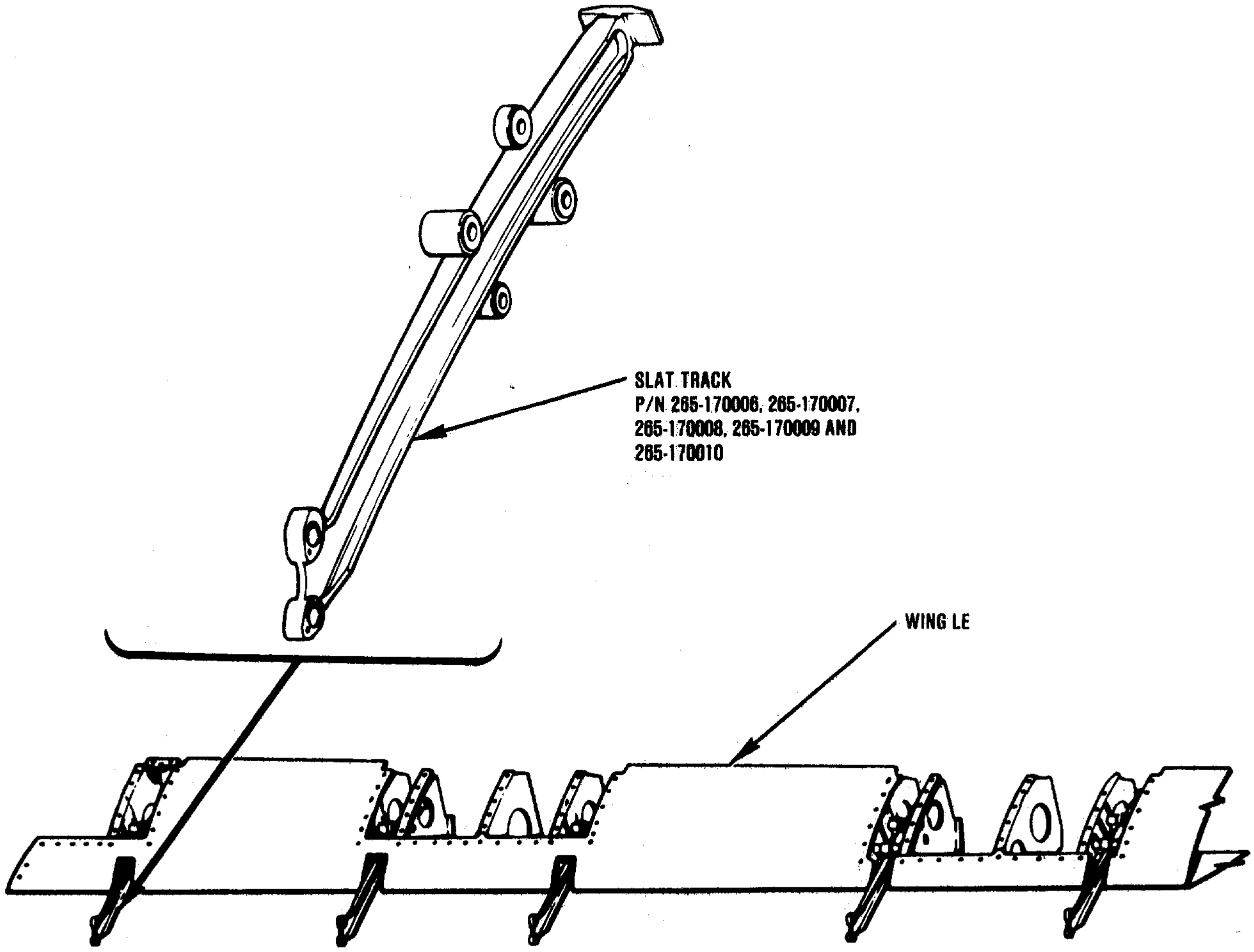
This section contains negligible damage limits for the flight surfaces.

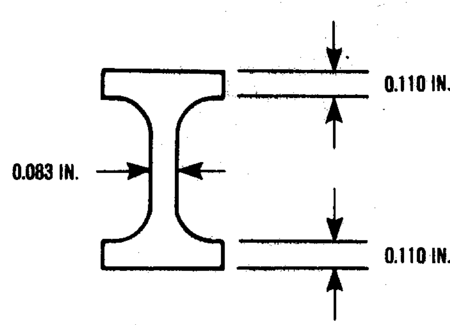
MAXIMUM WEAR ALLOWANCES — LEADING EDGE SLAT TRACKS — MODEL NA 265-40, -60, -70, AND -80

See figure 101 for maximum wear allowances for the leading edge slat tracks for model NA 265-40, -60, -70, and -80.

MAXIMUM WEAR ALLOWANCES — INBOARD AND OUTBOARD FLAP TRACKS — MODEL NA 265-60A, -60SC, -65, -80A AND -80SC

See figure 102 for maximum wear allowances for the inbd and outbd flap tracks for model NA 265-60A, -60SC, -65, -80A, and -80SC.



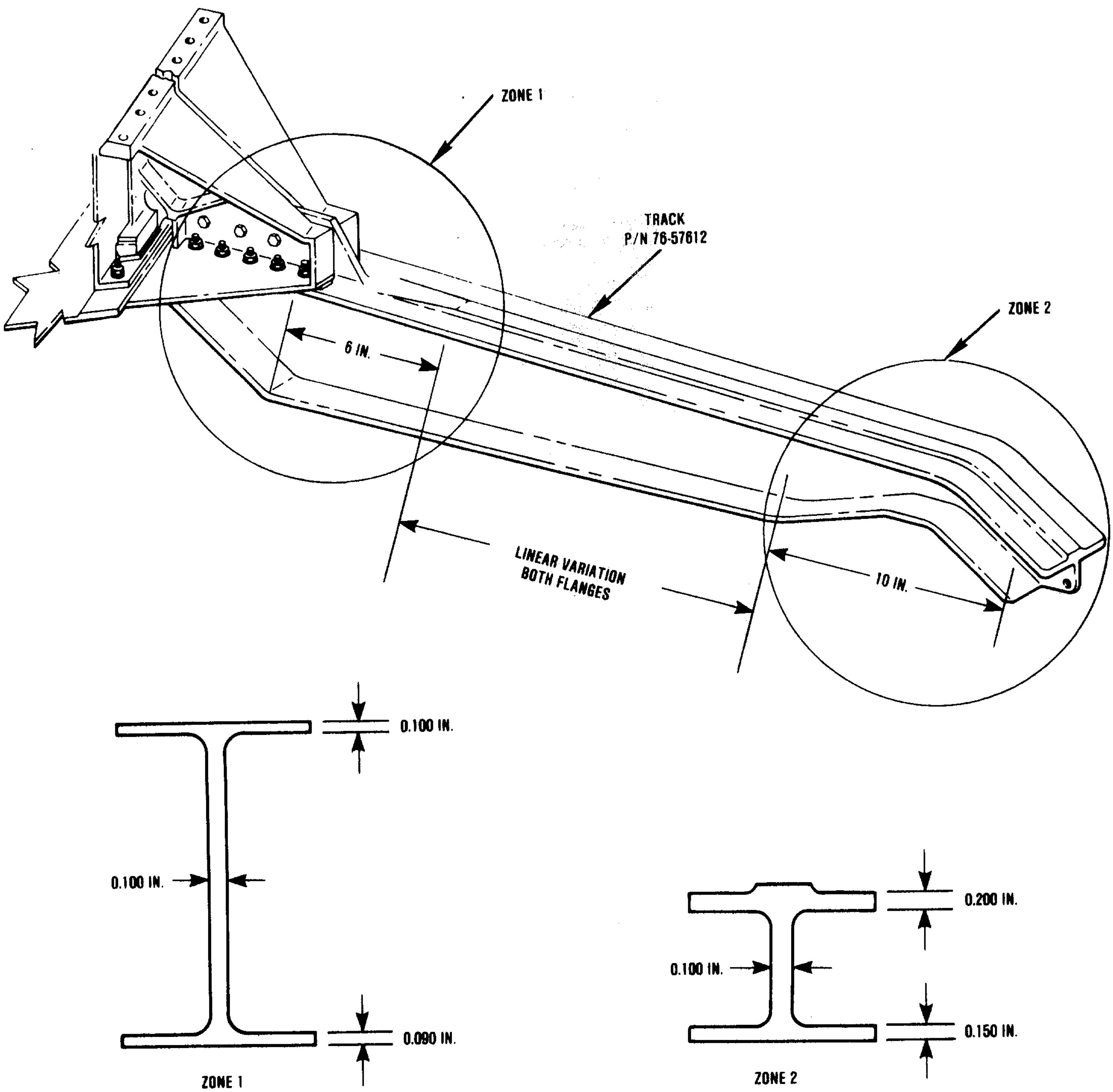


TYPICAL TRACK SECTION
MIN ALLOWABLE DIMENSIONS

NOTE

IF SLAT TRACK EXCEEDS MAX WEAR ALLOWANCE REPLACE OR CONTACT SABRELINER ENGINEERING.

Maximum Wear Allowances — Wing Leading Edge Slat Tracks —
Model NA 265-40, -60, -70, and -80
Figure 101



MIN ALLOWABLE DIMENSIONS

NOTE

IF FLAP TRACKS EXCEED MAX WEAR LIMITS, REPLACE, OR CONTACT SABRELINER ENGINEERING.

Maximum Wear Allowances — Inboard and Outboard Flap Tracks Model NA 265-60A, -60SC, -65, -80A, and -80SC Figure 102

FLIGHT SURFACES

REPAIRS

GENERAL

This section contains repairs for the slats, ailerons, and flaps. For applicability of repairs, refer to 57-50-00

STATIC BALANCING AILERONS

Whenever a repair has been performed on an aileron, it is essential that the repaired surface be static-balance-checked. Rebalance repaired surface if it is not within specified tolerance. The procedures for checking the static balance and the addition of weights (if required) are given in figures 201 through 204.

BALANCE REQUIREMENT

AILERON	BALANCE
265-160001	0 TO 10 IN. — LBS. NOSE HEAVY

AILERON REPAIRS

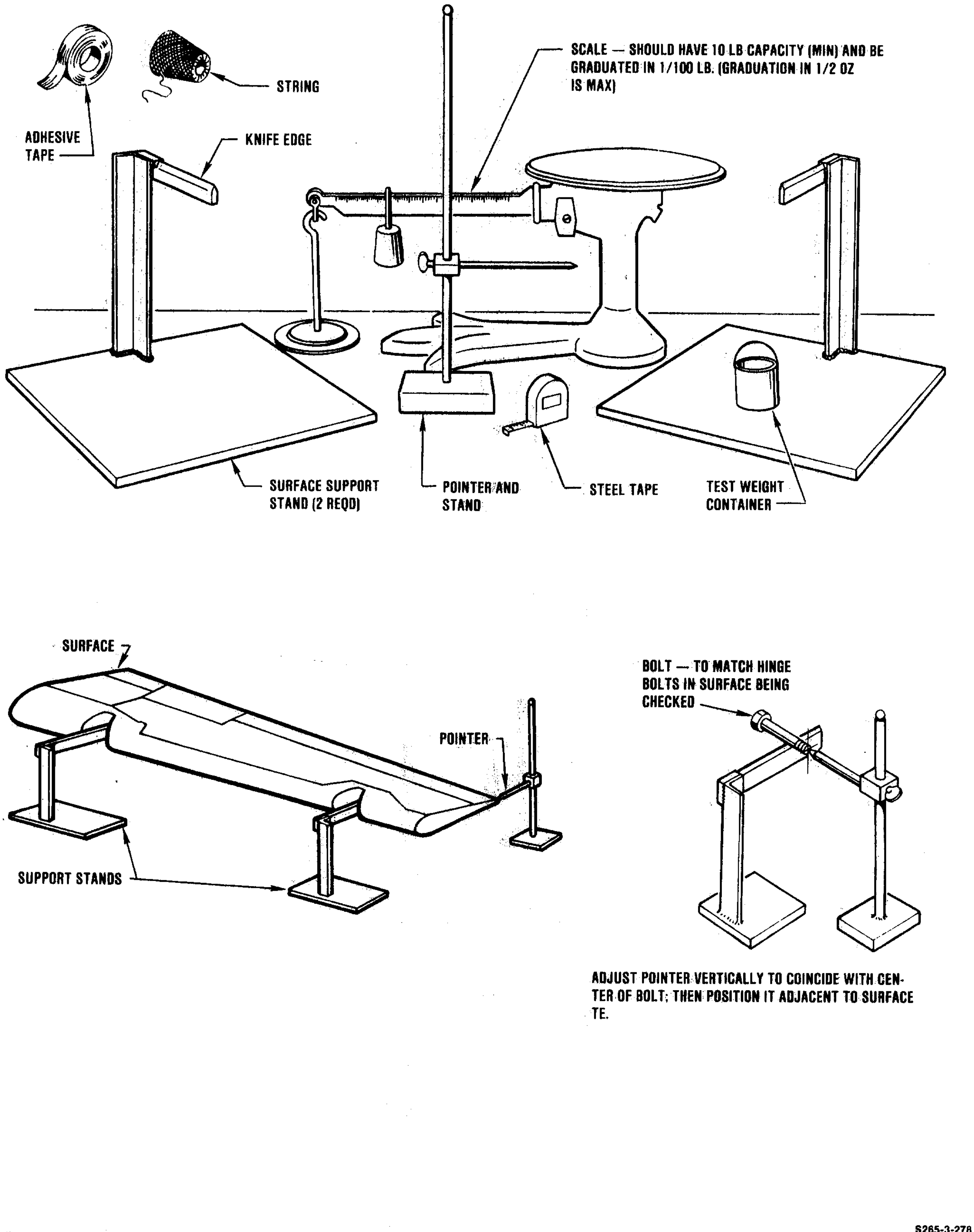
Repairs to ailerons are given in figures 205 through 208.

FLAP REPAIRS

Repairs to flaps are given in figures 209 through 211.

SLAT REPAIRS

Repairs to slats are given in figure 212.



Static Balance Checking Equipment
Figure 201

1 Place aileron on support stands on a level bench.

2 Adjust pointer to height of hinge centerline, then place it adjacent to aileron TE. TE of aileron should be even with pointer (0 balance) or above pointer (nose heavy).

3 To determine actual aileron unbalance, proceed as follows:

(a) Tape test weight container to TE edge as shown.

(b) Add weights to container until aileron TE is directly opposite pointer.

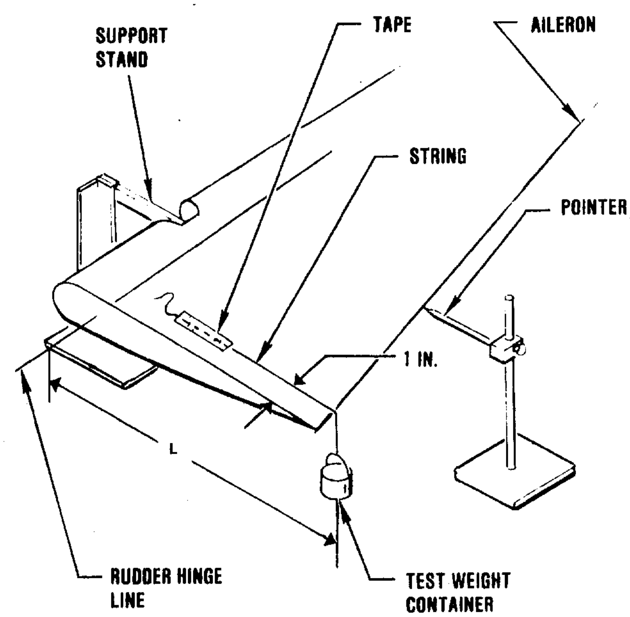
(c) Measure distance from center of container to aileron hinge line to determine "L" dimension.

(d) Weigh test container and contents.

(e) Multiply weight by "L" dimension to determine in. pounds of unbalance. Unbalance condition must be within tolerance shown on "Aileron Balance Requirement" chart or weights must be added to bring aileron into a balanced condition. Refer to Adding Rebalancing Weight, figure 204.

AILERON BALANCE REQUIREMENTS

AILERON	BALANCE
265 — 160001 — 51 & 52 — 61 & 62 — 71 & 72 — 81 & 82	0 — 10 IN. — LB NOSE HEAVY

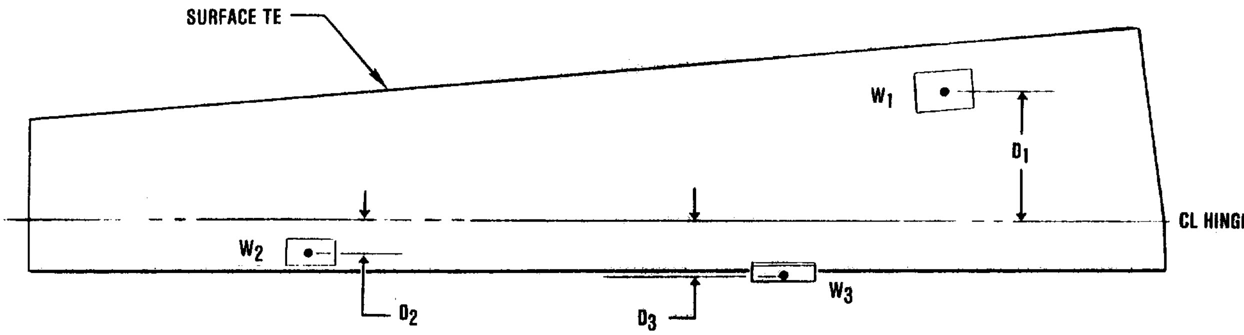


NOTE

ABOVE PROCEDURE IS FOR A COMPLETE AILERON INCLUDING TRIM TAP AND TRIM TAB ACTUATOR (IF APPLICABLE), AND PAINT.

S265-3-279A

Checking Aileron Static Balance
Figure 202



W_1 — Net weight of repair aft of hinge line. (Net weight of repair is total weight of repair minus weight of any removed material.)

W_2 — Net weight of repair fwd of hinge line.

W_3 — Weight of repair balance weight.

D_1 — Distance from CG of W_1 to CL of hinge.

D_2 — Distance from CG of W_2 to CL of hinge.

D_3 — Distance from CG of W_3 to CL of hinge.

CALCULATING REBALANCE WEIGHT REQUIREMENTS

Moment (in.-pound effect) of a repair is found by multiplying weight of repair by moment arm (distance from CG of repair to hinge centerline). Weight of rebalance weight required to counterbalance repair is found by dividing in.-pound effect of repair by distance from CG of rebalance weight to hinge centerline.

Considering repair W_1 only in sketch. Formula is $\frac{W_1 \times D_1}{D_3} = W_3$.

EXAMPLE
(assigning possible numberical values)

$W_1 = 0.5$ lb
$D_1 = 10.5$ in.
$D_3 = 4.75$ in.

SOLUTION

$$W_3 = \frac{\overset{(W_1)\ (D_1)}{0.5 \times 10.5}}{\underset{(D_3)}{4.75}} = \frac{5.25}{4.75} = 1.1 \text{ lb}$$

If a LE repair, represented by W_2 in sketch, is installed simultaneously with repair represented by W_1, counterbalancing effect of W_2 is subtracted from in.-pound effect of W_1 before solving for rebalance weight (W_3). Using values given in first example and assigning W = 0.4 lb and D = 2.5 in., solution is:

$$W_3 = \frac{\overset{(W_1)\ (D_1)\quad (W_2)\ (D_2)}{(0.5 \times 10.5) - (0.4 \times 2.5)}}{\underset{(D_3)}{4.75}} = \frac{4.25}{4.75} = 0.89 \text{ lb}$$

NOTE

CALCULATIONS MAY BE MADE USING 0.284 POUND PER CUBIC IN. FOR STEEL ALLOYS AND 0.1 POUND PER CUBIC IN. FOR ALUMINUM ALLOYS.

ALLOWABLE MOMENT OF INERTIA INCREASE

Allowable moment of inertia increase (expressed in lb in.^{2}) determines permissible extent of repairs in relation to total weight that must be added (repair plus rebalance weight).

Moment of inertia increase is sum of increases from each added weight.

Referring to sketch, formula would be:

Moment of inertia increase $= (W_1 \times D_1^2) + (W_2 \times D_2^2) + (W_3 \times D_3^2)$

Using values assigned in calculating rebalance weight requirements:

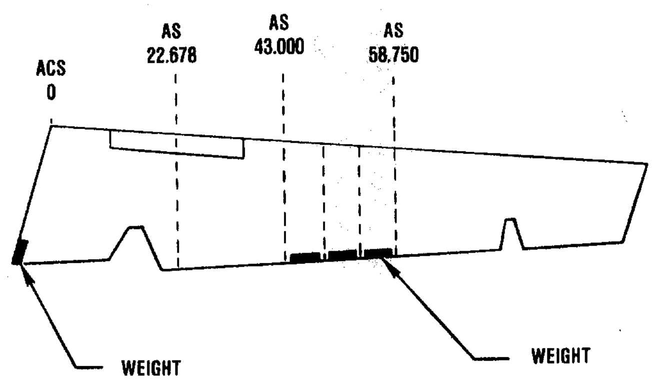
Moment of inertia increase $= (0.5 \times 10.5^2) + (0.4 \times 2.5^2) = (0.89 \times 4.75^2)$
$= 55.13 + 2.5 + 20.1$
$= 77.73$ lb in.^{2}

MOMENT OF INERTIA INCREASE LIMITS

265-160001-52 and -62 aileron, RH -89 lb in.^{2}
265-160001-51 and -61 aileron, LH -64 lb in.^{2}
265-160001-72 aileron, RH -71 lb in.^{2}
265-160001-71 aileron, LH -43 lb in.^{2}

8265-3-280A

Static Rebalance Calculations
Figure 203



AILERON

ABBREVIATIONS
AS — AILERON STATION C — CANTED

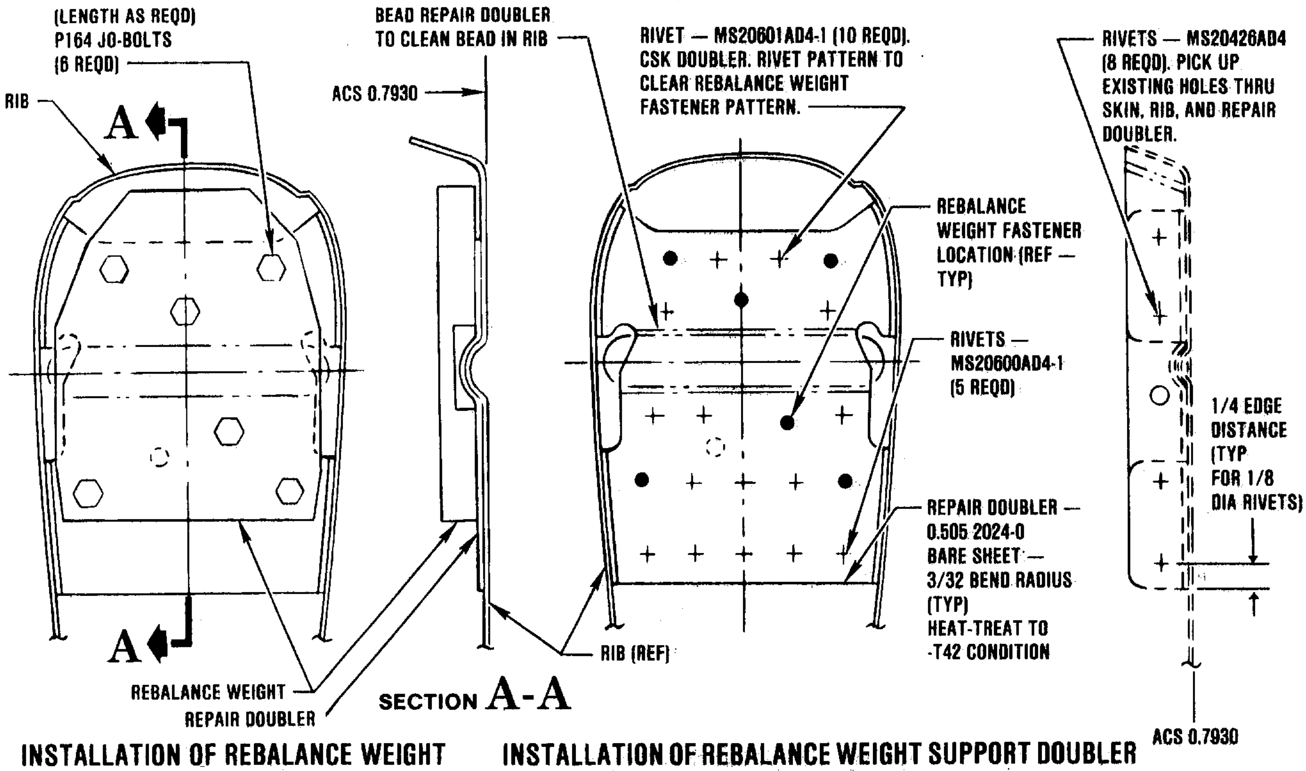
NOTES

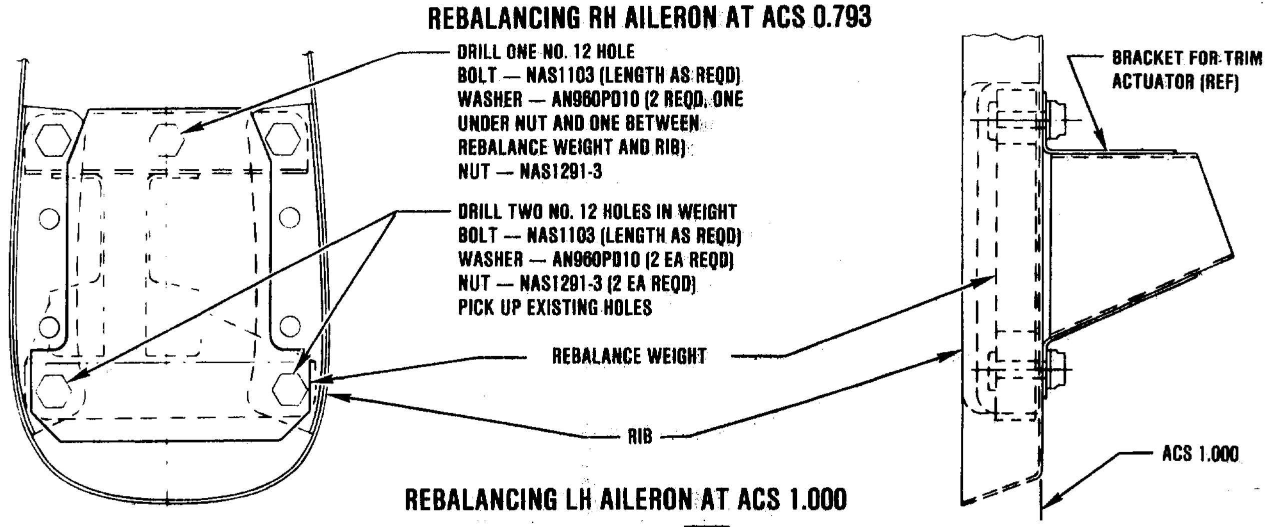
- FOR REPAIR INBD OF AS 22.678, ADD REBALANCE WEIGHT TO INBD RIB (ACS 0).
- FOR REPAIR OUTBD OF AS 22.678, ADD REBALANCE WEIGHT BETWEEN AS 43.000 AND 58.750, SELECTING THE BAY NEAREST THE REPAIR.
- MAX MOMENT OF INERTIA INCREASE:

  265-160001-52 AND -62 AILERON, RH -89 LB IN.^{2}
  265-160001-51 AND -61 AILERON, LH -64 LB IN.^{2}
  265-160001-72 AILERON, RH -71 LB IN.^{2}
  265-160001-71 AILERON, LH -43 LB IN.^{2}
  265-160001-82 AILERON, RH -71 LB IN.^{2}
  265-160001-81 AILERON, LH -43 LB IN.^{2}

S265-3-281B

Adding Rebalance Weights
Figure 204 (Sheet 1 of 4)





RIGHT-HAND AILERON

1 Remove AN7510-1 plate from fwd section of rib, relocate it aft of present location, and install with four MS20600AD4-1 rivets. (Old holes need not be plugged.)

2 Fabricate repair doubler as shown. Heat-treat repair doubler to -T42 condition after forming.

3 Prime repair doubler with zinc-chromate primer.

NOTE

INSTRUCTIONS FOR FABRICATION OF REBALANCE WEIGHTS ARE GIVEN ON SHEET 4.

4 Install repair doubler as shown.

5 Install rebalance weight as shown.

LEFT-HAND AILERON

1 Remove two fwd mounting bolts in trim actuator bracket.

2 Install rebalance weight as shown.

S265-3-282

Adding Rebalance Weights
Figure 204 (Sheet 2 of 4)

1 Make cutout in skin as shown, to provide access.

2 Remove existing weight.

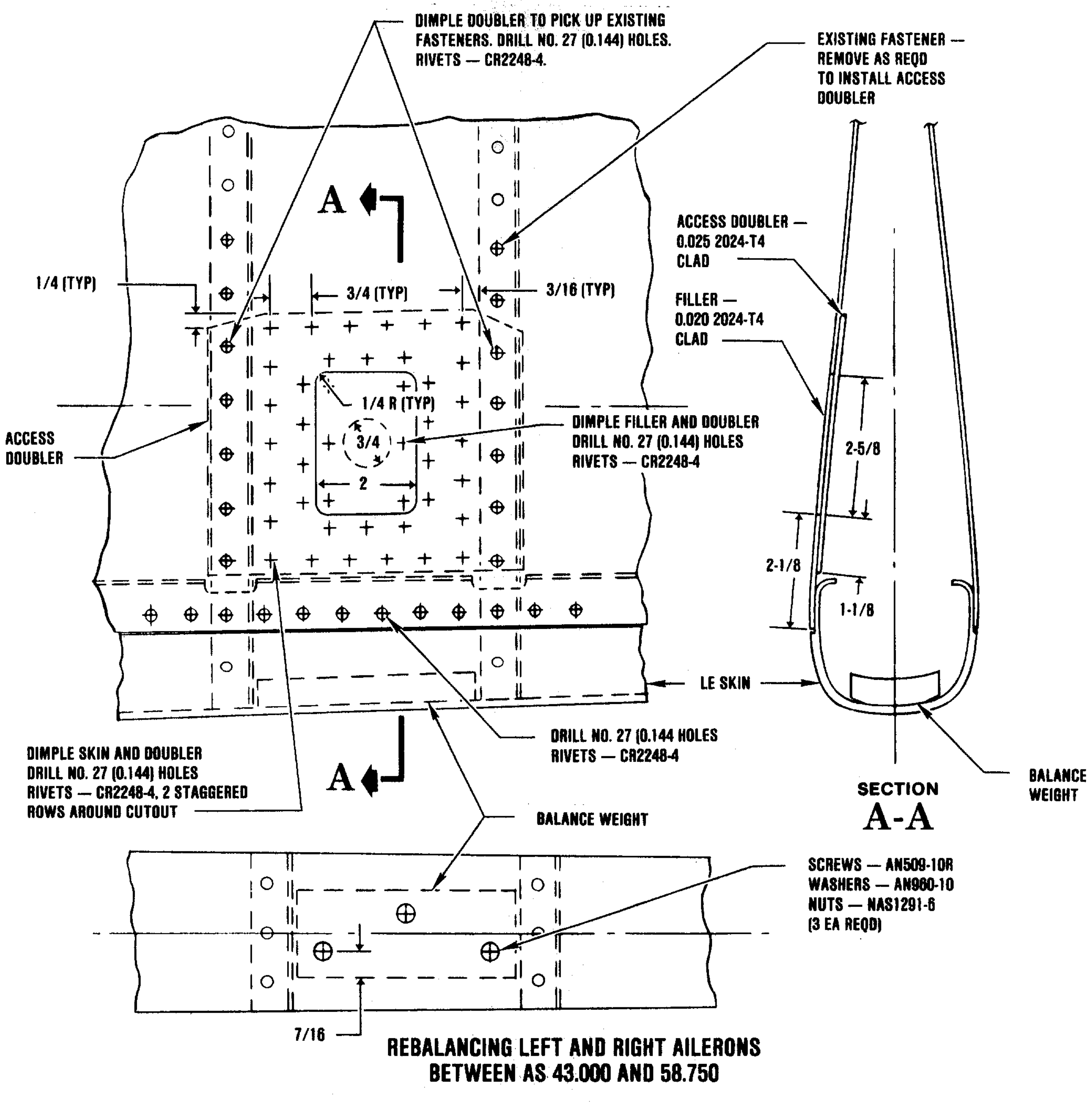
3 Drill holes in new weight to match existing holes in LE skin.

4 Attach new weight to LE with AN509-10R screws as shown. (Length of screw is determined by thickness of weight.)

5 Fabricate access doubler and filler.

6 Prime access doubler and filler.

7 Install parts as shown.



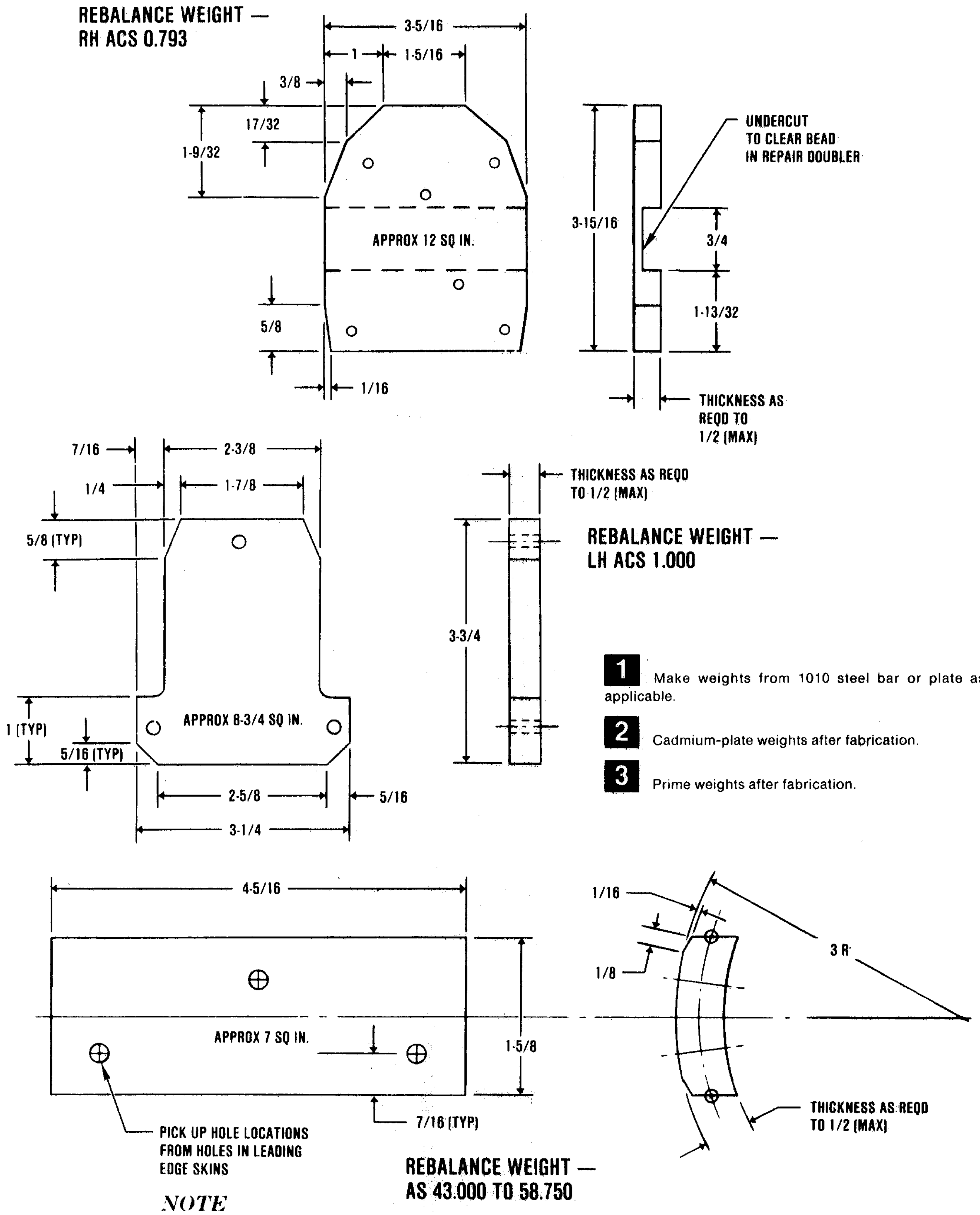
REBALANCING LEFT AND RIGHT AILERONS BETWEEN AS 43.000 AND 58.750

NOTE

INSTRUCTIONS FOR FABRICATION OF REBALANCE WEIGHTS ARE GIVEN ON SHEET 4.

S265-3-283

Adding Rebalance Weights
Figure 204 (Sheet 3 of 4)



1 Make weights from 1010 steel bar or plate as applicable.

2 Cadmium-plate weights after fabrication.

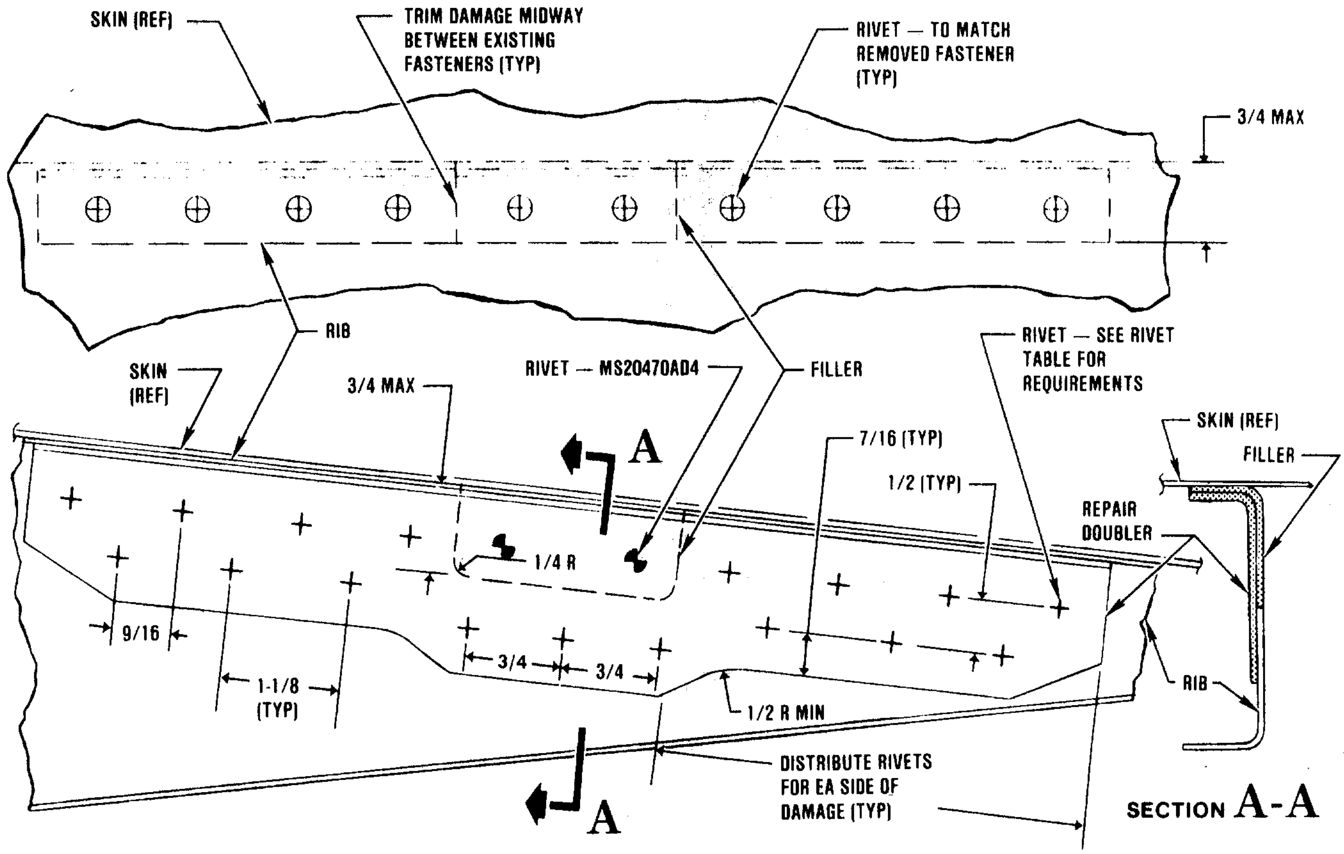
3 Prime weights after fabrication.

NOTE

IF REQUIRED THICKNESS OF WEIGHT IS LESS THAN 5/16 IN., MAKE WEIGHT IN TWO PIECES.

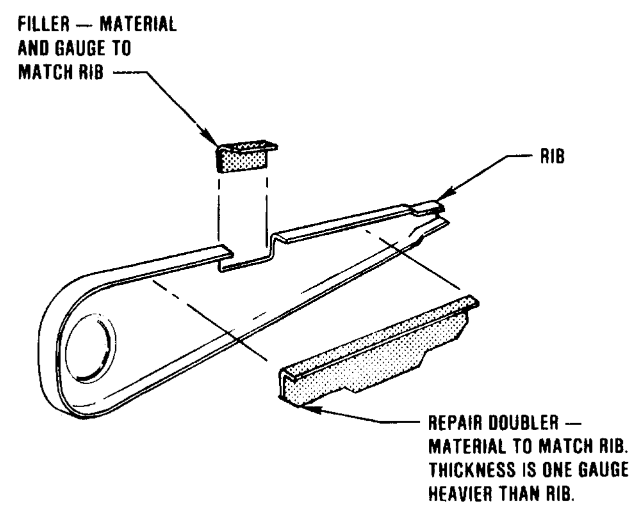
S265-3-284A

Adding Rebalance Weights
Figure 204 (Sheet 4 of 4)



RIVET TABLE

RIB MATERIAL (CLAD)	GAUGE	RIVET — MS20470	NO. REQD EA SIDE OF DAMAGE
2024-T3	0.020	AD4	8
2024-T3	0.025	AD5	7
2024-T3	0.032	AD5	7
2024-T3	0.040	AD5	6
2024-T3	0.050	DD6	4
2024-T3	0.063	DD6	5
7075-T6	0.020	AD4	10
7075-T6	0.025	AD5	8
7075-T6	0.032	AD5	8
7075-T6	0.040	AD5	7
7075-T6	0.050	DD6	5
7075-T6	0.063	DD6	6



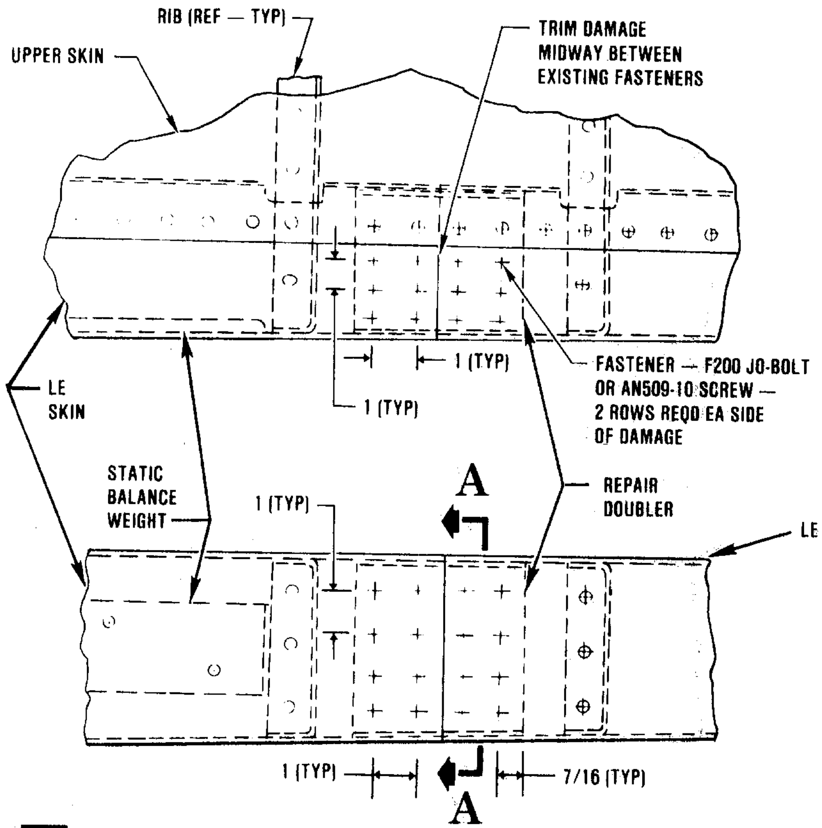
1. Trim out damage.
2. Fabricate repair parts.
3. Heat-treat parts made from annealed materials.
4. Prime repair parts.
5. Install repair parts.

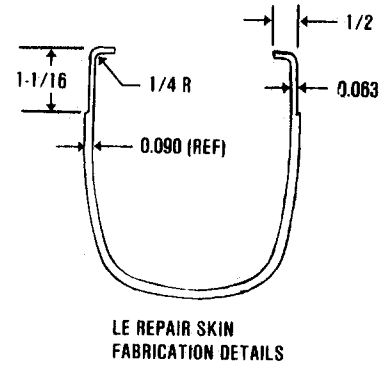
NOTES

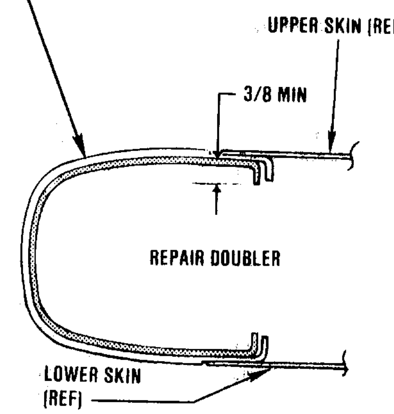
- THIS REPAIR IS APPLICABLE TO FLANGED SHEET-METAL RIBS WITH FLANGE WIDTH OF 3/4 IN. OR LESS.
- USE A SPECIFIC REPAIR WHEN INDICATED IN THE REPAIR INDEX KEYS.

S265-3-270

Aileron Rib Repairs
Figure 205







SECTION A-A

1 Remove TE and loosen portions of upper and lower skins as required.

2 Trim off damaged skin.

3 Fabricate repair parts. Make repair skin from 7075-O. Heat-treat after fabrication. Machine and form aft edges of repair skin as shown. Contour skin to match removed section. Make repair doubler from normalized material. Heat-treat after forming.

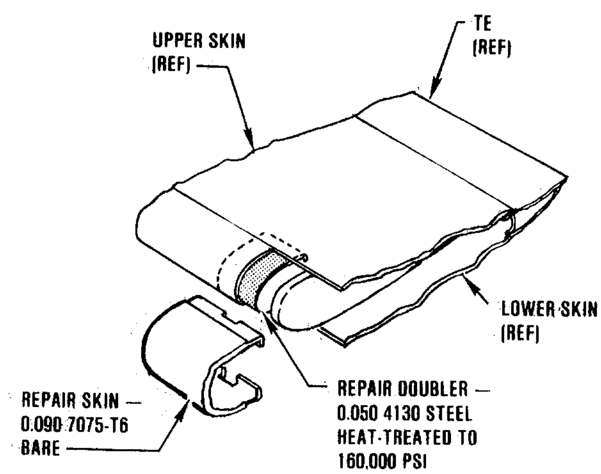
4 Cadmium-plate repair doubler.

5 Prime repair parts.

6 Temporarily install repair parts and check static balance. Alter balance weight as necessary to fit inside repair doubler and to achieve a balanced condition.

7 Install repair parts, refasten upper and lower skins, and reinstall TE assembly.

8 Refinish repair to match surrounding areas.

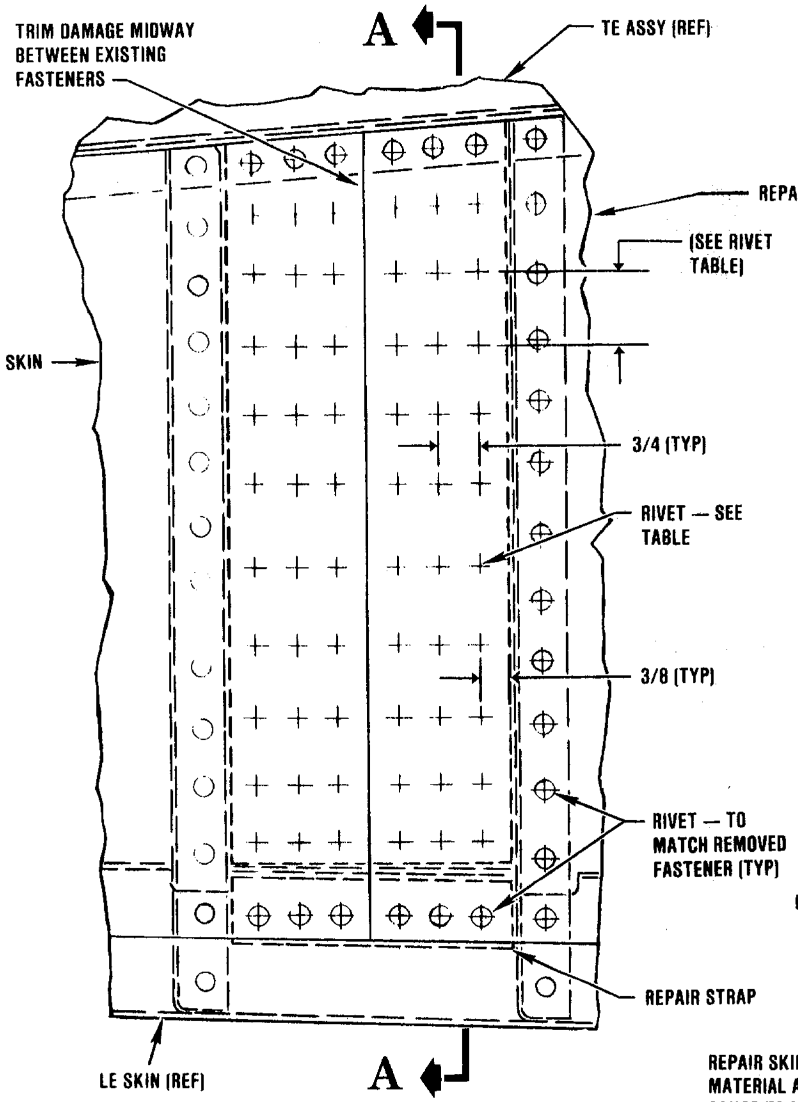


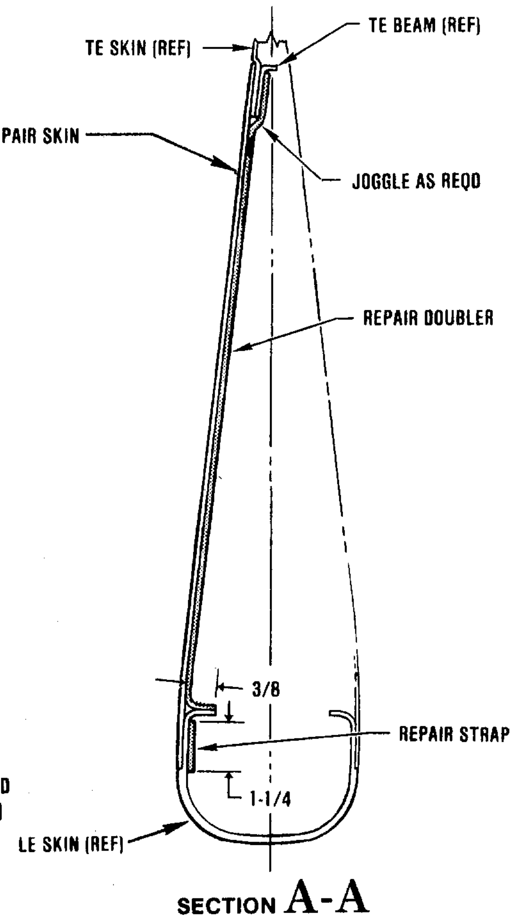
NOTES

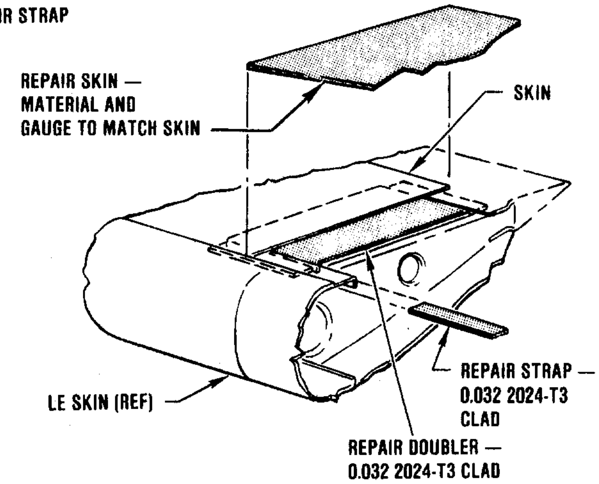
- THIS REPAIR IS APPLICABLE TO AILERON LE SKIN BETWEEN AS 27.5 AND 64 AND OUTBD OF AS 81.5.
- ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER MAY BE MADE, USING THE DATA GIVEN.

S265-3-271

Aileron Leading Edge Skin Repairs
Figure 206







1 Remove TE assembly as necessary.

2 Trim off damaged skin.

3 Fabricate and temporarily install repair parts.

4 Check static balance and rebalance as necessary.

5 Secure repair parts in place and replace TE assembly(ies) as applicable.

6 Refinish repair to match surrounding areas.

NOTES

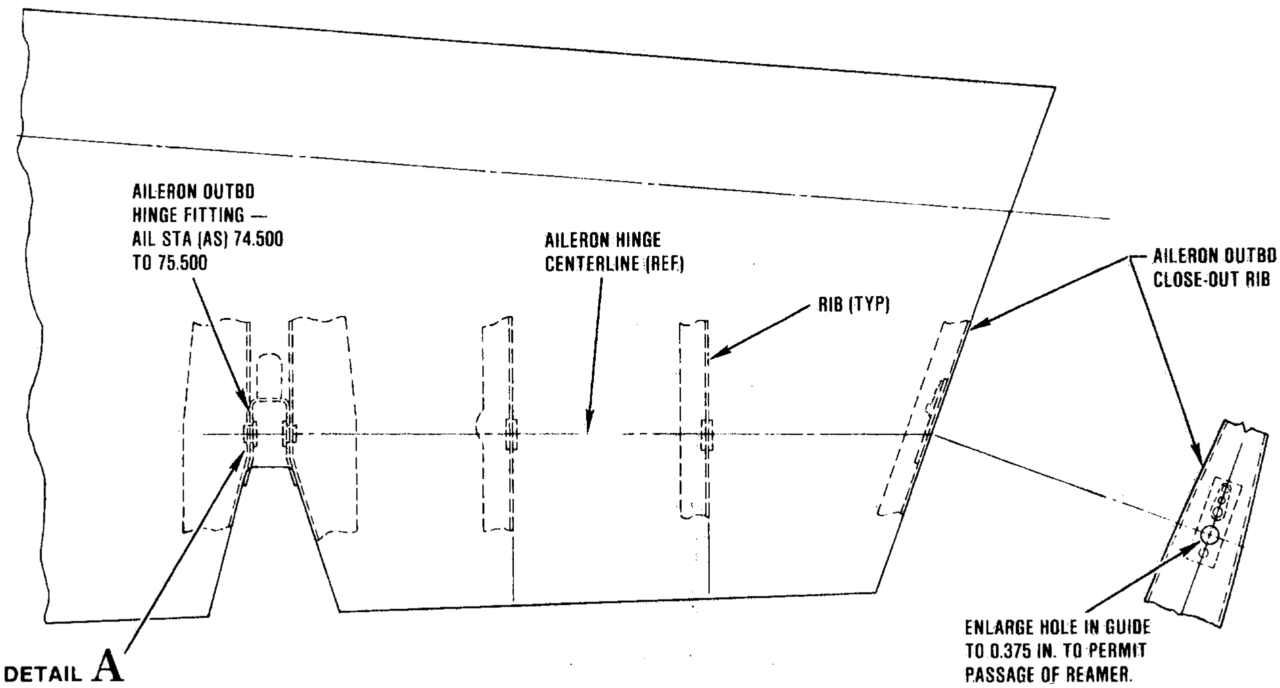
- THIS REPAIR IS APPLICABLE TO UPPER AND LOWER AILERON SKINS.
- ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER MAY BE MADE, USING THE REPAIR DATA PRESENTED IN THIS REPAIR.

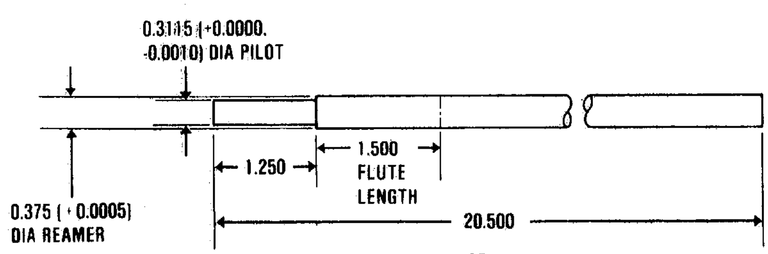
RIVET TABLE

RIVET	ROWS REQD	SPACING
MS20426AD4	2	7/8
CR2248-5	3	1

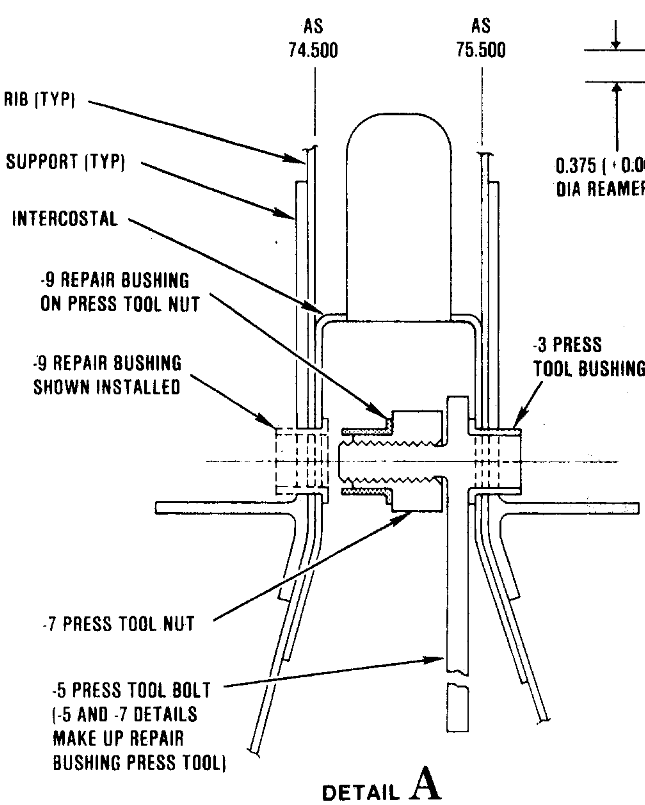
S265-3-272

Aileron Aft Skin Repairs
Figure 207





-11 REAMER
(SUGGESTED CONFIGURATION)



DETAIL A

NOTE

SEE TOOL AND REPAIR BUSHING FABRICATION DETAILS ON SHEET 2.

1 Enlarge hole in guide on close-out rib.

2 Ream holes in hinge fitting with -11 reamer.

3 Install -3 bushing in reamed hole on one side of fitting.

4 Install a -9 bushing on press tool (detail A).

5 Align press tool in -3 bushing. Hold -5 bolt and turn -7 nut, pressing repair bushing in place.

NOTE

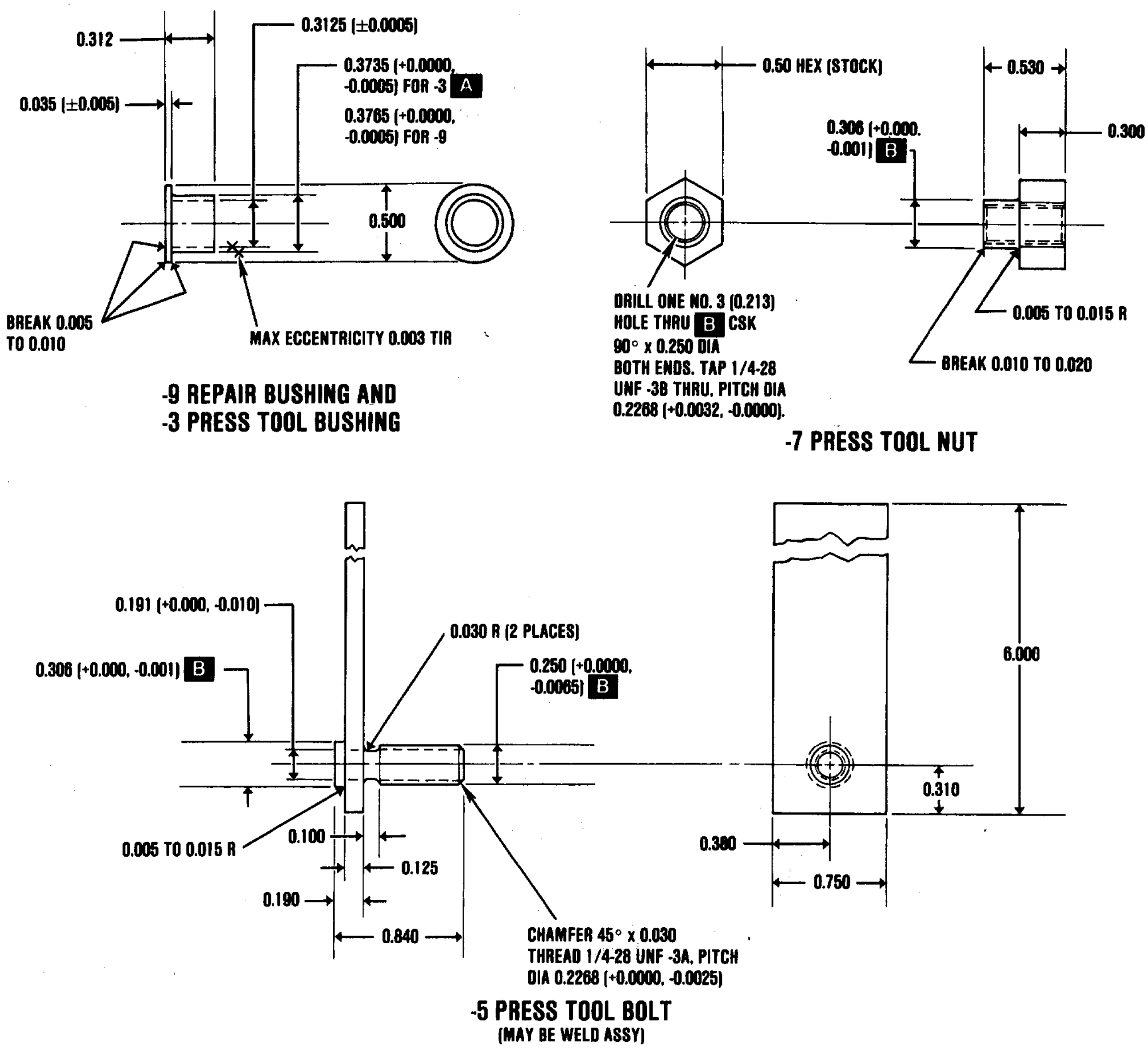
WHEN REPAIR BUSHING IS STARTED IN HOLE, PAINT OUTER SURFACES OF BUSHING WITH ZINC CHROMATE PRIMER, AND INSTALL BUSHING WHILE PRIMER IS WET.

6 Remove press tool and -3 bushing.

7 Repeat step 5 on opposite side of fitting with press tool aligned in installed repair bushing instead of -3 bushing.

S370-3-74A

Aileron Outboard Hinge Fitting Bushing Repair
Figure 208 (Sheet 1 of 2)



DASH NO.	NOMENCLATURE	MATERIAL	HEAT-TREAT	SURFACE FINISH
-9	REPAIR BUSHING C	4130 STEEL TUBE — COND N	125 TO 145 KSI PER MIL SPEC MIL-H-6875	125
-3	PRESS TOOL BUSHING	4130 STEEL TUBE — COND N	125 TO 145 KSI PER MIL SPEC MIL-H-6875	125
-5	PRESS TOOL BOLT	4130 STEEL BAR — COND F4	----	125
-7	PRESS TOOL NUT	4130 STEEL BAR (HEX) — COND F4	----	125

NOTES

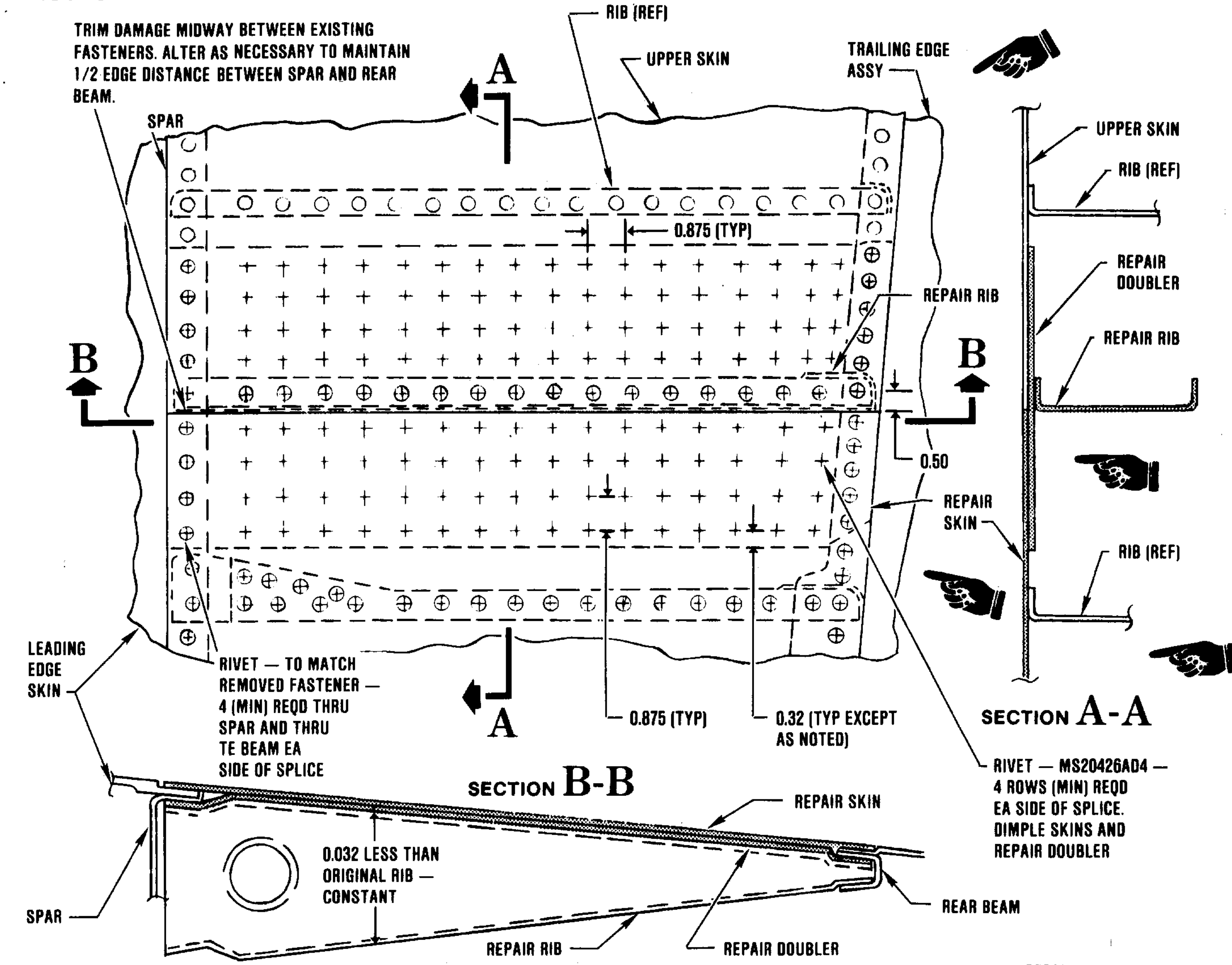
A DIMENSIONS APPLY BEFORE PLATING. CADMIUM-PLATE ALL SURFACES EXCEPT INSIDE DIA.

B MAX ECCENTRICITY 0.003 TIR.

C TWO REQUIRED FOR EACH FITTING REPAIR.

S370-3-75

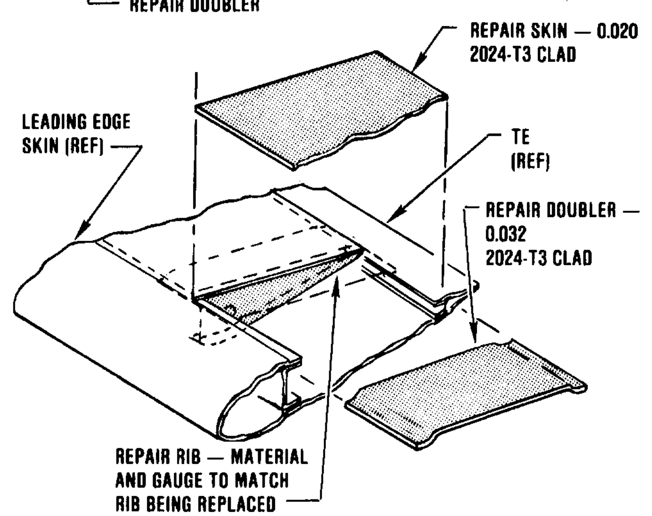
Aileron Outboard Hinge Bushing Repair
Figure 208 (Sheet 2 of 2)



1. Remove TE assembly.
2. Trim off damaged skin.
3. Fabricate repair parts. Repair rib is identical to the original rib except as noted. Make rib from annealed material and heat-treat to applicable "T" condition.
4. Prime repair parts with MIL-P-23377C.
5. Install repair parts and refinish repair to match surrounding areas.

NOTES

- *This repair is applicable to flap upper and lower skins except in areas between pairs of hinge and actuator ribs (i.e., between FS 84.769 and 87.393; 111.974 and 118.640; and 148.756 and 151.381).*
- *Any smaller repair incorporating a one-piece doubler may be made, using the data presented.*

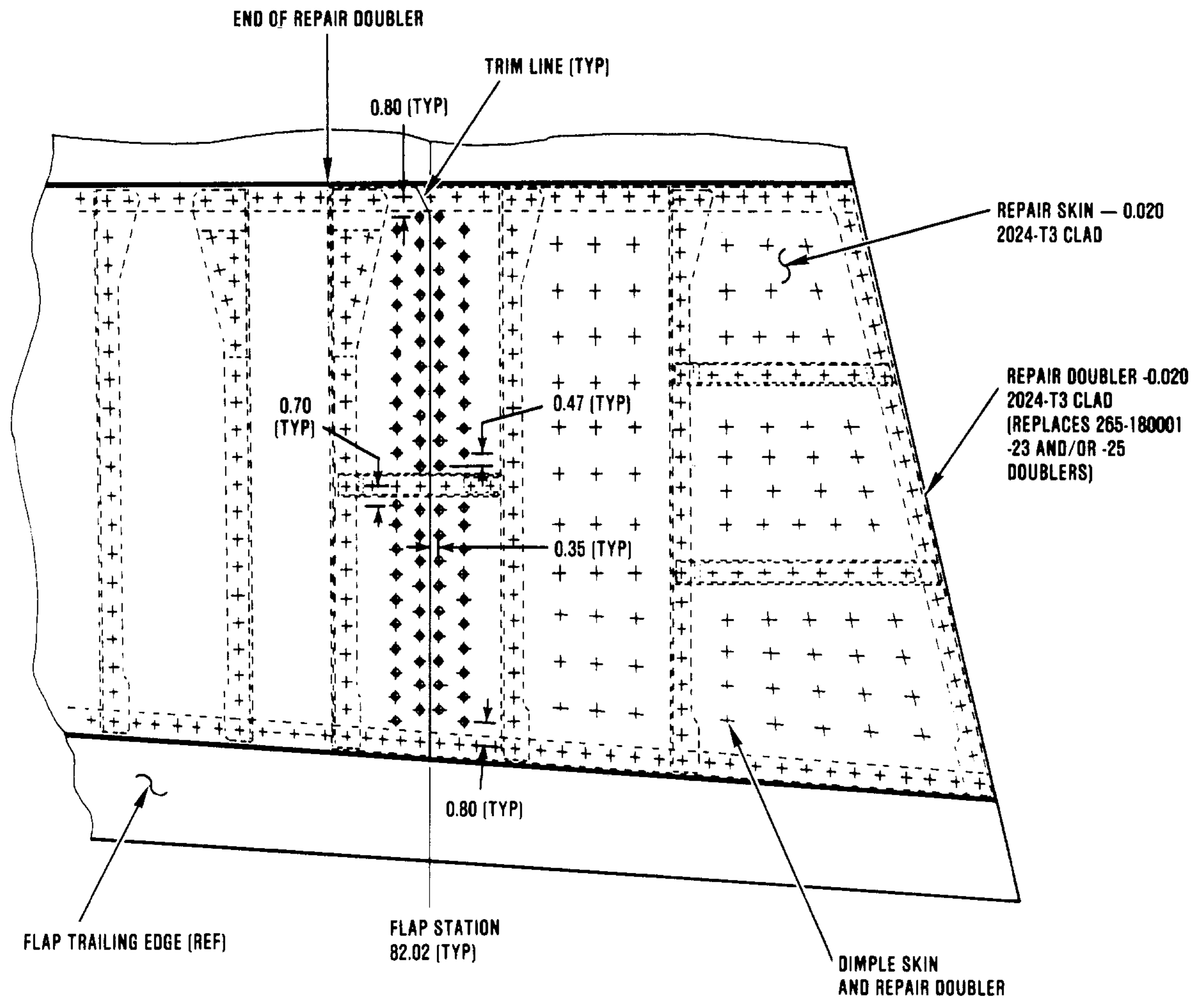


S265-3-273

Figure 209 — Flap Skin Repairs

LEGEND

- Existing Fastener Location
- MS20426AD4 Fastener Location (40 Ea)
- CR3212-4 Fastener Location (40 Ea)



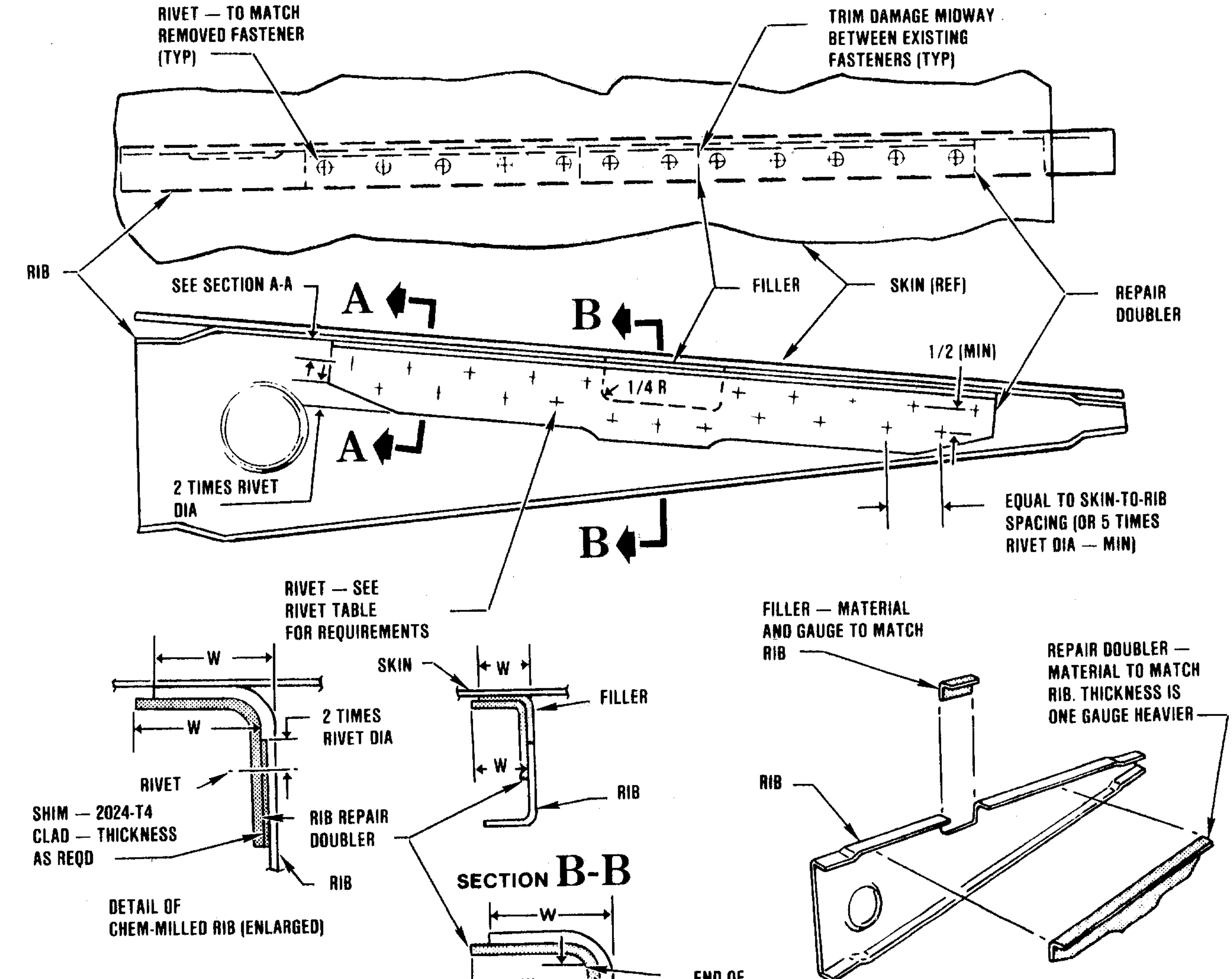
1. Trim off damaged skin.
2. Fabricate repair parts and pick up 80 additional fastener locations.
3. Prime repair parts with MIL-P-23377C.
4. Use PR1431G Sealant between mating surfaces.
5. Install repair parts and refinish repair to match surrounding areas.

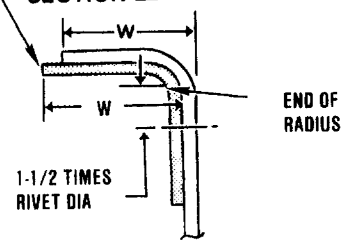
NOTES

- *This repair is applicable to LH and RH upper and lower skin P/N 265-180068 and P/N 265-180089.*

Figure 209A — Flap Skin Repairs (Sonic Doublers)

NEW





SECTION A-A
(ENLARGED)

1 Trim out damage.

2 Fabricate repair parts. Form flanged parts from annealed material and heat-treat to applicable "T" condition after forming.

3 Prime repair parts.

4 Install repair parts.

NOTES

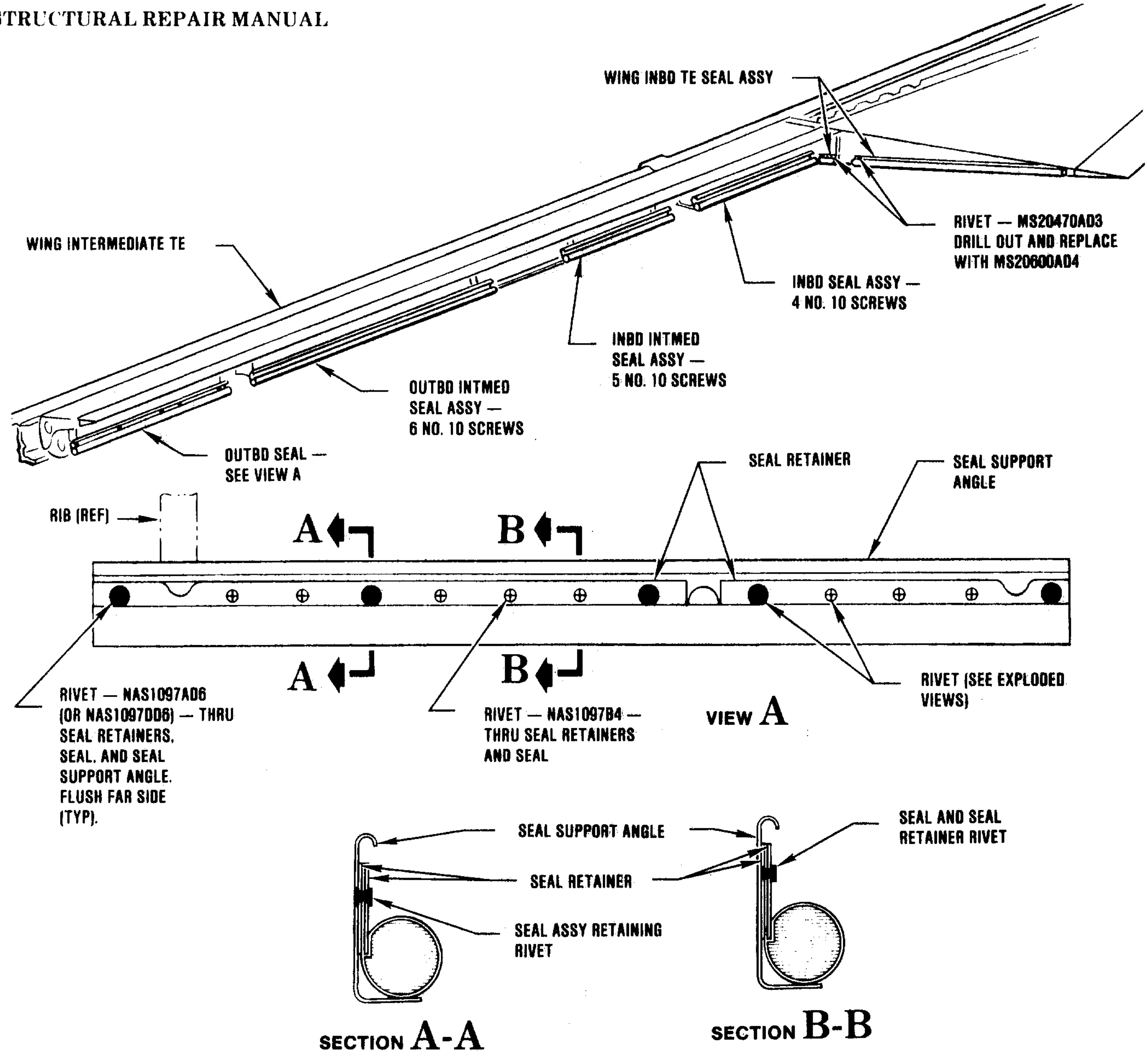
- THIS REPAIR IS APPLICABLE TO FLAP RIBS LISTED IN RIVET TABLE.
- WHEN DAMAGE IS TOO CLOSE TO EITHER END OF RIB TO PERMIT INSTALLATION OF REQUIRED RIVETS (EACH SIDE OF DAMAGE), A NEW RIB MAY BE FABRICATED. MATERIAL AND GAUGE OF NEW RIB MUST MATCH RIB BEING REPLACED EXCEPT THAT MATERIAL NEED NOT BE THINNED (AS IN CHEM-MILLED RIBS).

RIVET TABLE

FS	RIVET — MS20470	NO. REQD EA SIDE OF DAMAGE
79.269	AD4	10
84.576	AD5	10
87.393	AD5	11
92.233	AD4	10
97.074	AD4	10
101.914	AD4	10
106.774	AD4	10
111.974	DD6	6
114.344	DD6	6
119.640	DD6	6
123.840	AD4	10
128.846	AD4	10
133.802	AD4	10
139.757	AD4	10
143.713	AD4	10
148.756	AD5	8
151.381	DD6	7
156.981	AD4	10
162.381	AD4	10

S265-3-274

Flap Rib Repairs
Figure 210



1 To remove seal assemblies from either TE assembly, remove screws or drill out attaching rivets as applicable.

2 Drill out rivets attaching seal retainers to seal assembly (intermediate TE seals).

3 Rebuild all intermediate TE seal assemblies, using new rubber/fabric seals.

4 Reassemble intermediate TE seal assemblies as shown.

5 Rebuild inbd TE seals, using new rubber/fabric seals.

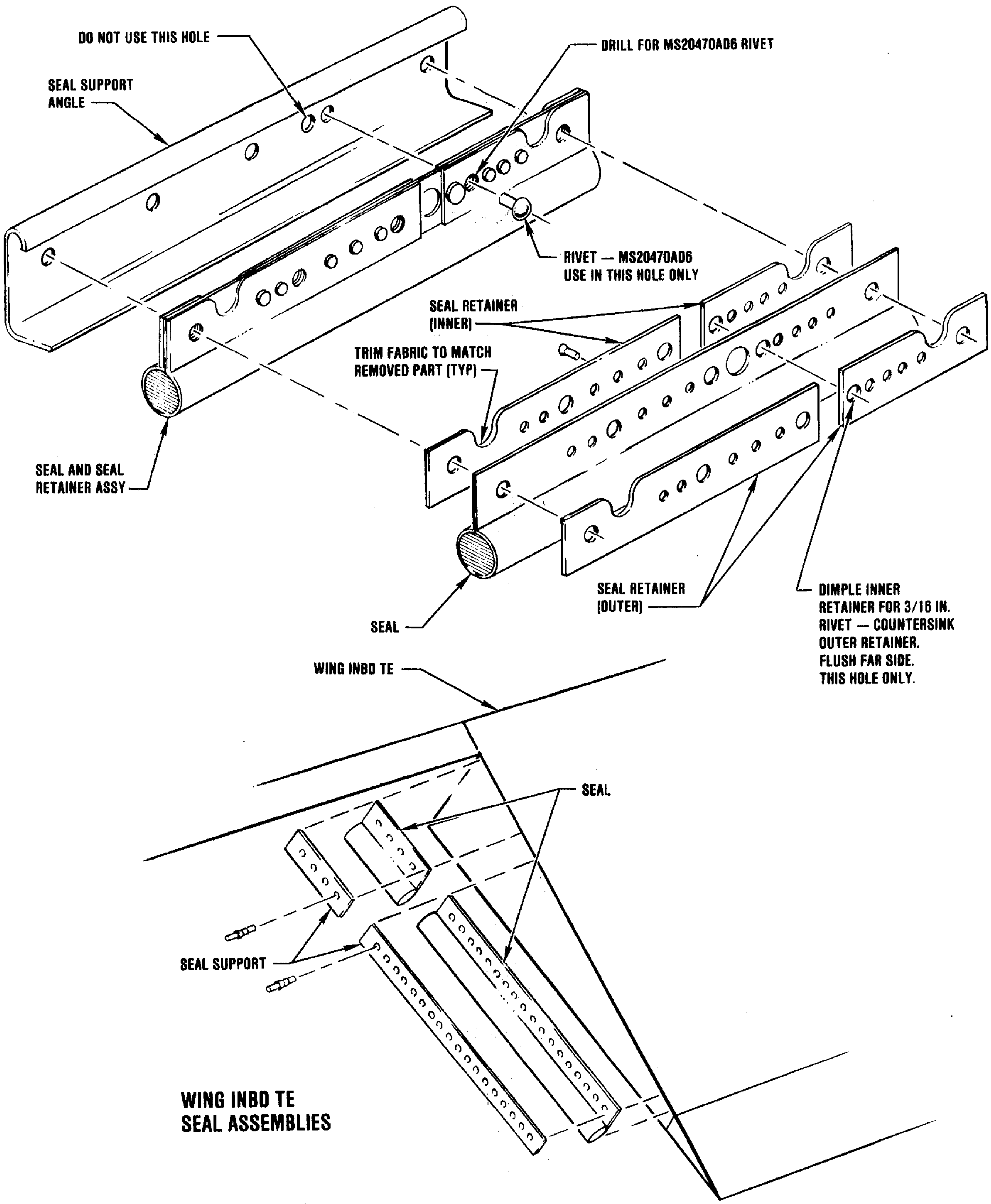
6 Reinstall inbd TE seal assemblies as shown.

NOTES

- THIS ILLUSTRATION PROVIDES INSTRUCTIONS FOR REPLACING ALL FLAP SEAL ASSEMBLIES.
- ALL FLAP SEAL ASSEMBLIES ON WING INTERMEDIATE TE EXCEPT OUTBD ASSEMBLY, ARE INSTALLED WITH SCREWS. OUTBD ASSEMBLY IS RIVETED. RIVETS ARE FLUSHED ON INNER (FWD) SIDE. THIS ASSEMBLY IS ILLUSTRATED IN DETAIL. OTHERS ARE SIMILAR EXCEPT FOR MOUNTING FASTENERS.
- FLAP SEALS ON WING INBD TE ARE INSTALLED WITH 3/32 IN. DRIVEN RIVETS.

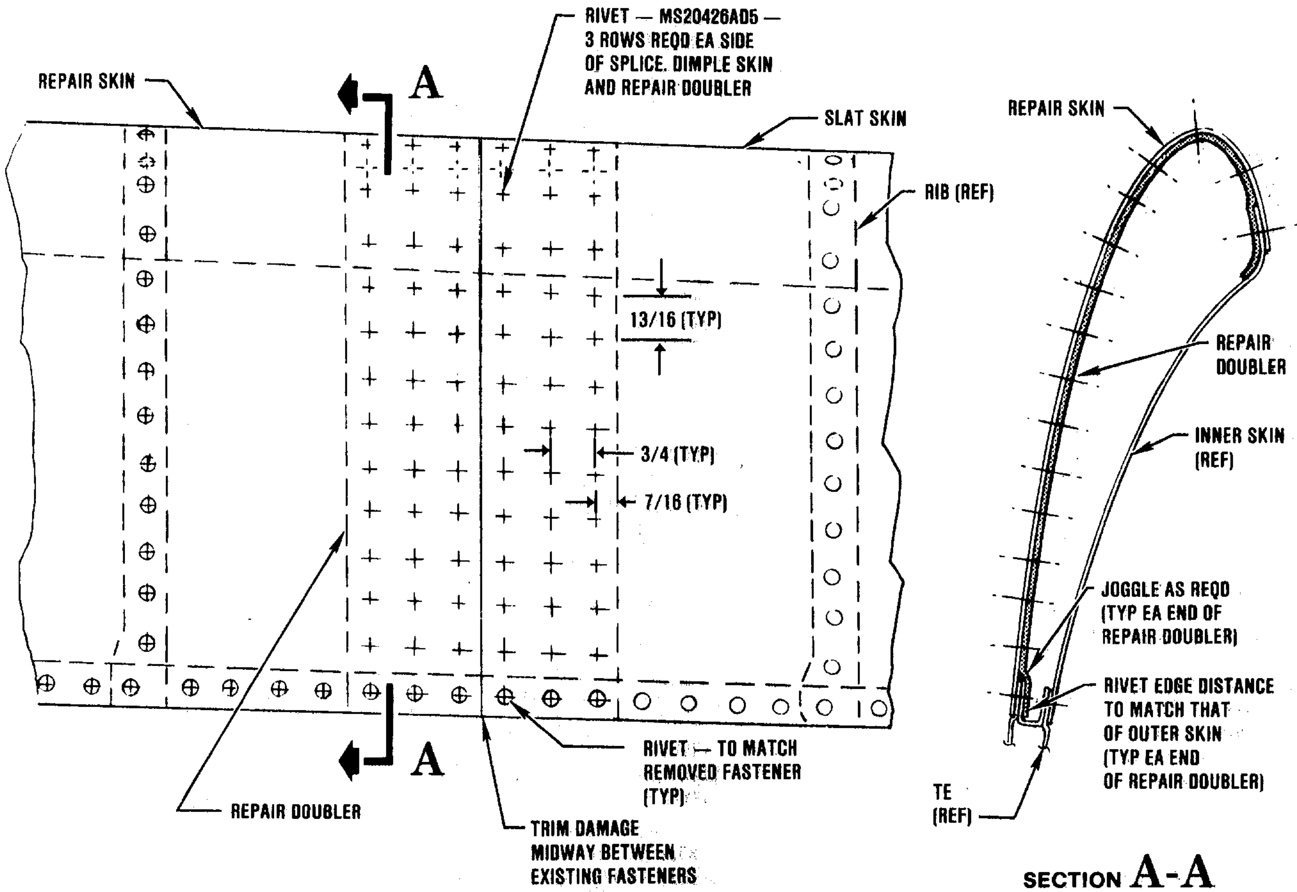
S265-3-275

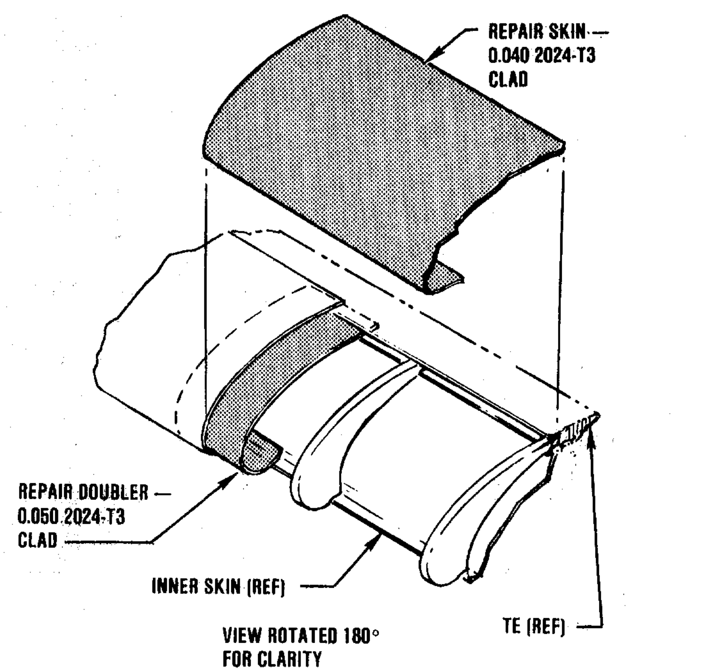
Replacing Flap Seals
Figure 211 (Sheet 1 of 2)



S265-3-276

Replacing Flap Seals
Figure 211 (Sheet 2 of 2)





1 Remove slat inner skin.

2 Trim off damaged outer skin.

3 Fabricate repair parts.

4 Install repair parts and reinstall inner skin.

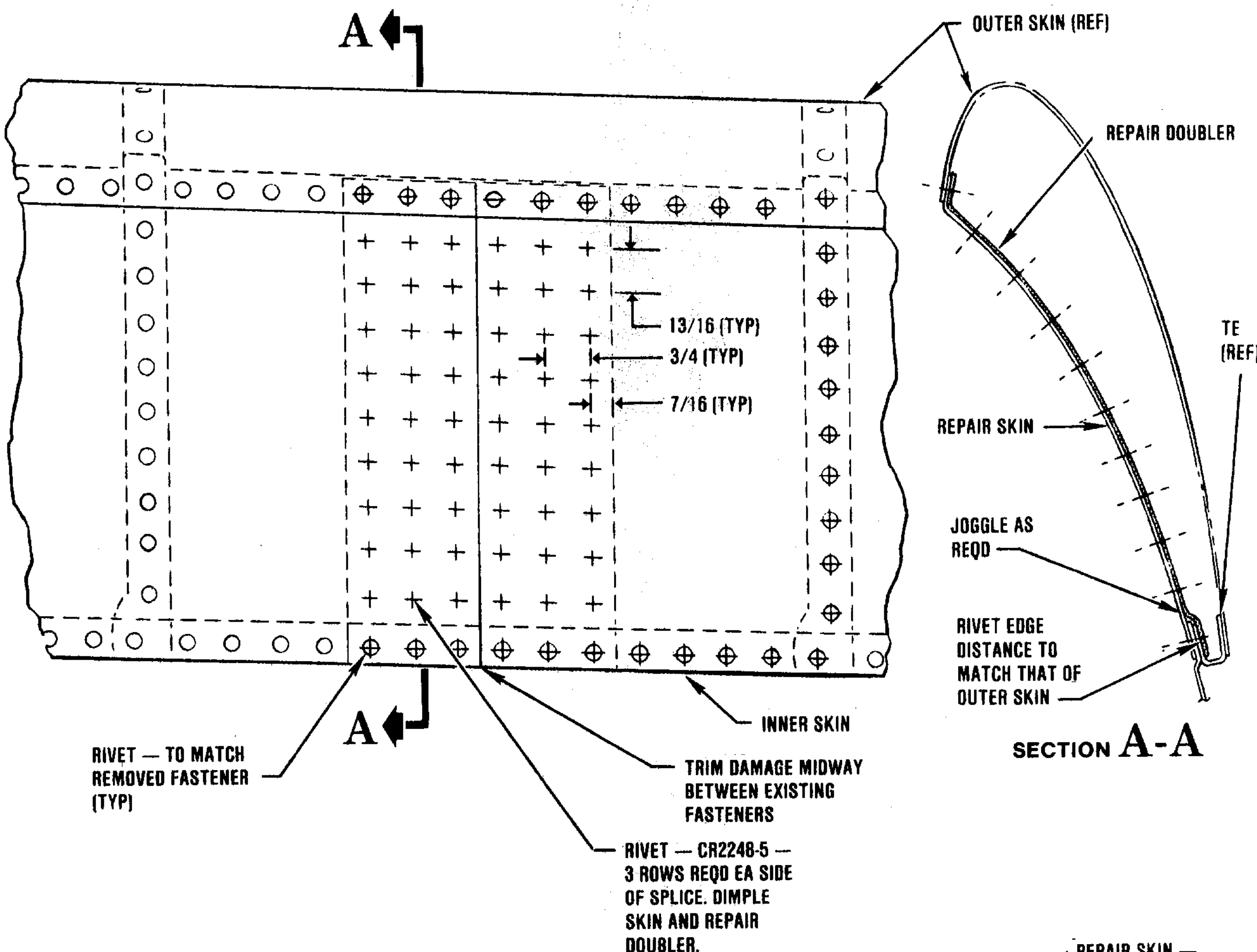
5 Refinish repair to match surrounding areas.

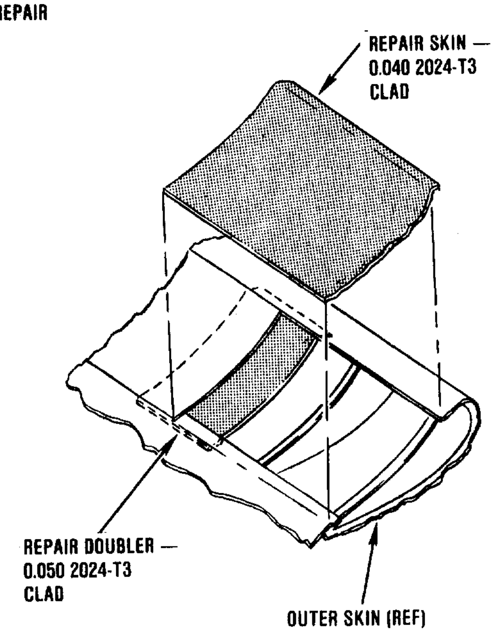
NOTE

A COMPLETE SKIN SPLICE IS SHOWN. ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER MAY BE MADE, USING REPAIR DATA GIVEN.

S265-3-268

Slat Skin Repairs
Figure 212 (Sheet 1 of 2)





1 Remove rivets holding outer skin to inner skin as necessary.

2 Trim off damaged inner skin.

3 Fabricate repair parts.

4 Install repair parts and refasten loosened outer skin.

5 Refinish repair to match surrounding areas.

NOTE

A COMPLETE SKIN SPLICE IS SHOWN. ANY SMALLER REPAIR INCORPORATING A ONE-PIECE DOUBLER MAY BE MADE, USING REPAIR DATA GIVEN.

S265-3-269

Slat Skin Repairs
Figure 212 (Sheet 2 of 2)

CHAPTER

78

EXHAUST

CHAPTER 78

EXHAUST

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CHAPTER 78

EXHAUST

LIST OF ILLUSTRATIONS

CHAPTER 78

EXHAUST

LIST OF EFFECTIVE PAGES

Chapter/ Section	Page	Date
78-L.E.P.	1/2*	Mar 16/90
78-CONTENTS	1/2	Aug 17/84
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78-00-00	1/2	Aug 17/84
78-30-00	1	Aug 17/84
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	208	Aug 17/84
	209	Aug 17/84
	210	Aug 17/84
	211	Aug 17/84
	212	Aug 17/84
	213/214	Aug 17/84

* The asterisk indicates pages revised, added, or deleted by the current revision.

CHAPTER 78

EXHAUST

STRUCTURAL IDENTIFICATION

GENERAL

This chapter contains information and repairs for components of the exhaust.

THRUST REVERSER

STRUCTURAL IDENTIFICATION

GENERAL

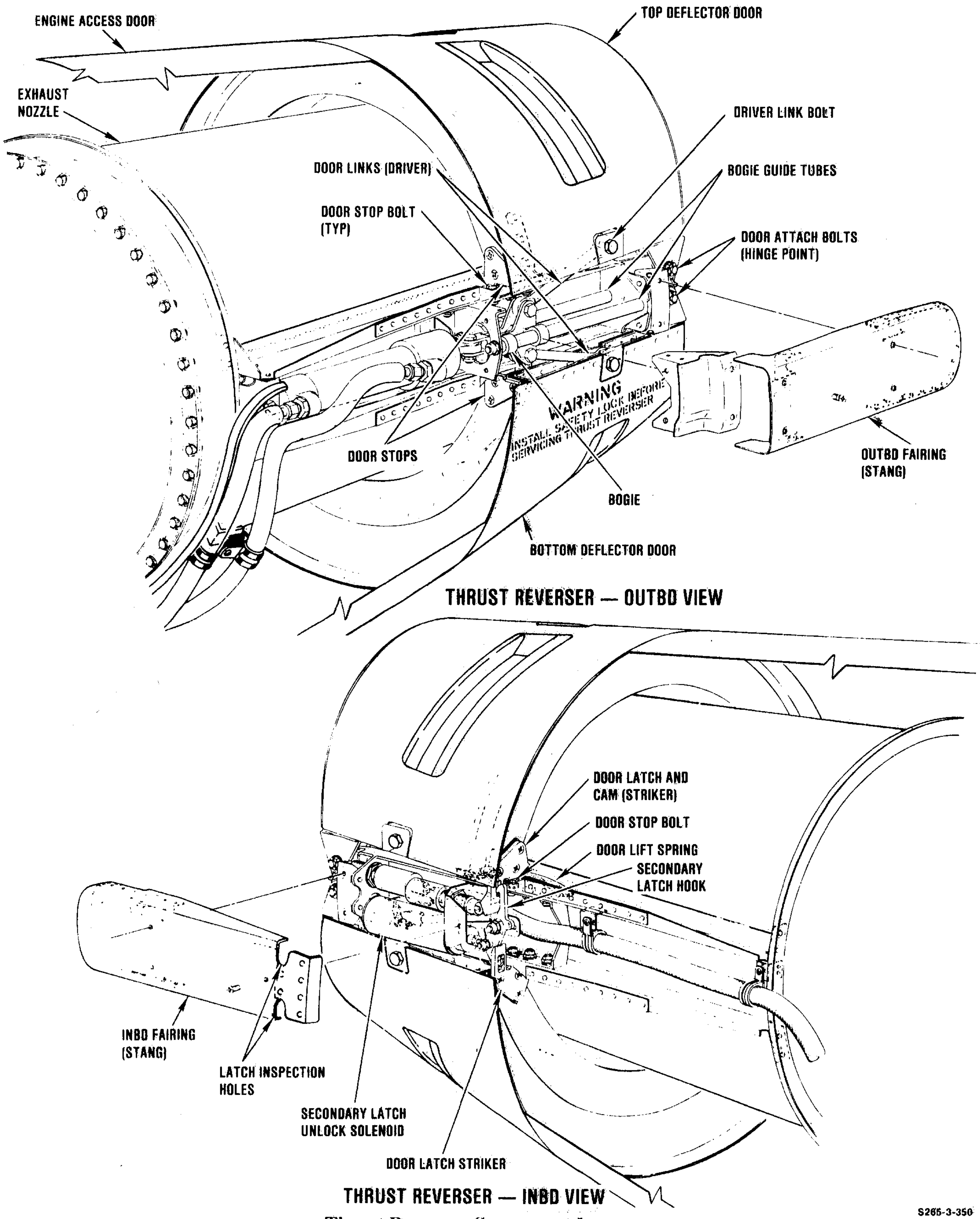
The engine thrust reverser system is used to decelerate the airplane during landing roll by diverting the engine exhaust gases forward, thus creating a breaking effect.

On model NA 265-40, -60, -60A, -60SC and -70 (S/N 370-2 thru -6, -8, and -9) equipped with thrust reversers this is accomplished by two doors (targets) attached to the rear of the tail pipe. When the doors are deployed (reverse thrust position), the exhaust gases are diverted fwd above and below the engine pod. The doors, when stowed, form the aft section of the engine cowling. The doors are operated (stowed or deployed) by a hydraulic actuator. The actuator is connected to a main drive link (bogie), which in turn is connected to each door through driver links.

On model NA 265-70 (S/N 370-1 and -7), -80, -80A, and -80SC the reversing elements consist of cascades and blocker doors which are nested between the exhaust nozzle and cowling during normal engine operation, but which are extended to a position aft of the exhaust nozzle to provide reverse thrust.

THRUST REVERSER COMPONENT LOCATOR — MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8 and -9)

See figure 1. The figure identifies the components of the thrust reverser.



Thrust Reverser Component Locator —
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 1

THRUST REVERSER

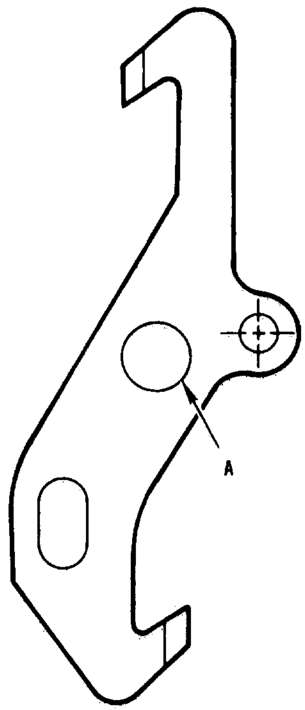
ALLOWABLE DAMAGE

GENERAL

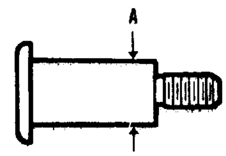
This section contains negligible damage limits for the thrust reverser.

WEAR ALLOWANCES — MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8, AND -9)

Figures 101 thru 106 show specific wear areas of the thrust reverser components and tables which provide wear allowance for each area.



DEFLECTOR DOOR LATCH HOOK



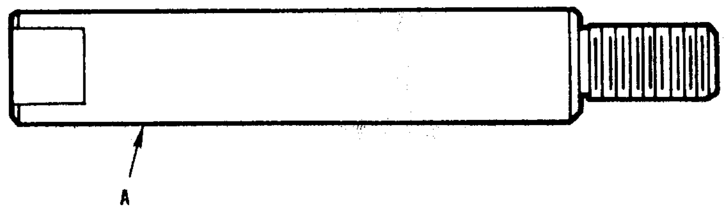
LATCH HOOK PIVOT BOLT

WEAR ALLOWANCES

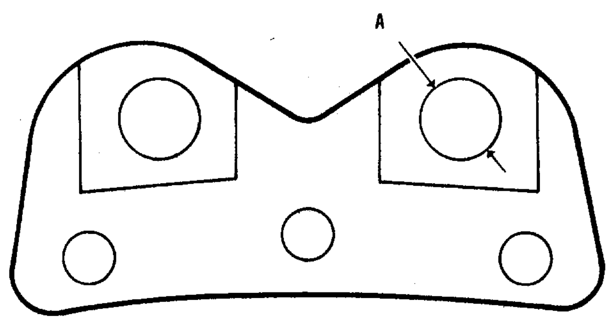
DESCRIPTION	PART NUMBER	DIA HOLE	MFG ALLOWANCE		MAX WEAR ALLOWANCE
			MIN	MAX	
DEFLECTOR DOOR LATCH HOOK	140-5442	A	0.3150	0.3190	0.002
LATCH HOOK PIVOT BOLT	140-5424	A	0.3110	0.3120	0.003

S265-3-336

Wear Allowances — Thrust Reverser Door Latch Hook and Latch Hook Pivot Pin, Model NA 265-40, -60, -60A, -60SC and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 101



GUIDE PIN



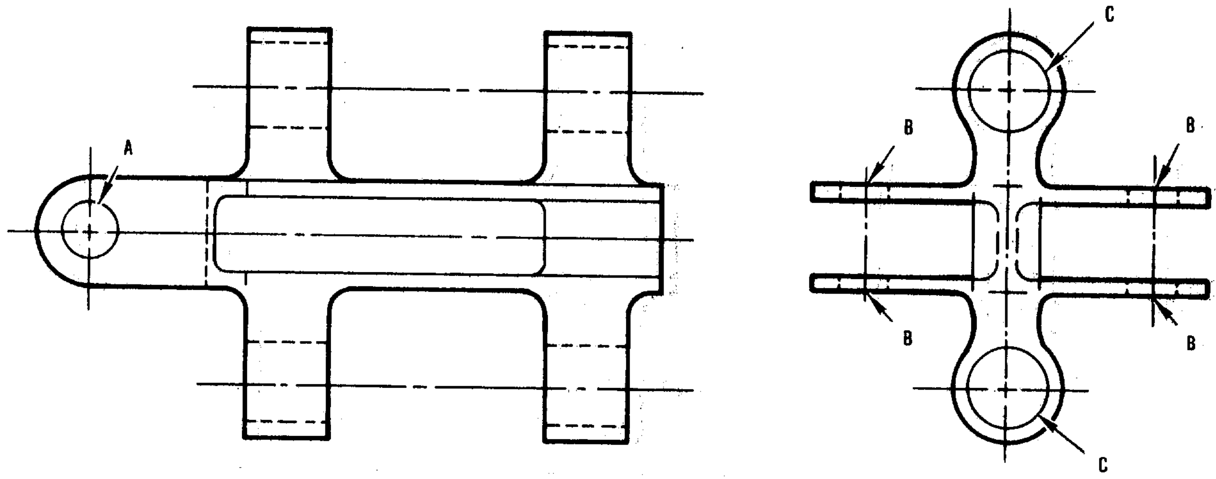
GUIDE PIN SUPPORT FITTING

WEAR ALLOWANCES

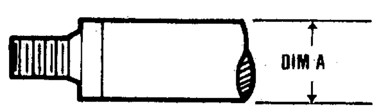
DESCRIPTION	PART NUMBER	DIA HOLE	MFG ALLOWANCE		MAX WEAR ALLOWANCE
			MIN	MAX	
GUIDE PIN	140-5481	A	0.3740	0.3745	0.014
GUIDE PIN SUPPORT FITTING	140-5478	A	0.3860	0.3900	0.014

S265-3-335

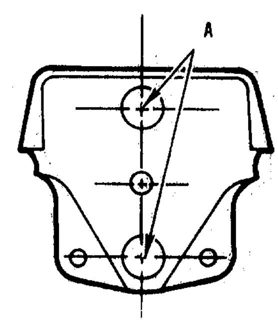
Wear Allowances — Thrust Reverser Guide Pins and Guide Pin Support Fittings, Model NA 265-40, -60, -60A, -60SC and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 102



BOGIE-DRIVE LINK



BOGIE TUBES



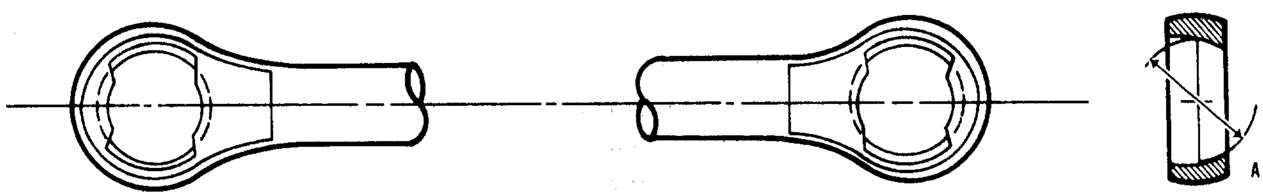
OUTBOARD SUPPORT FITTING

WEAR ALLOWANCES

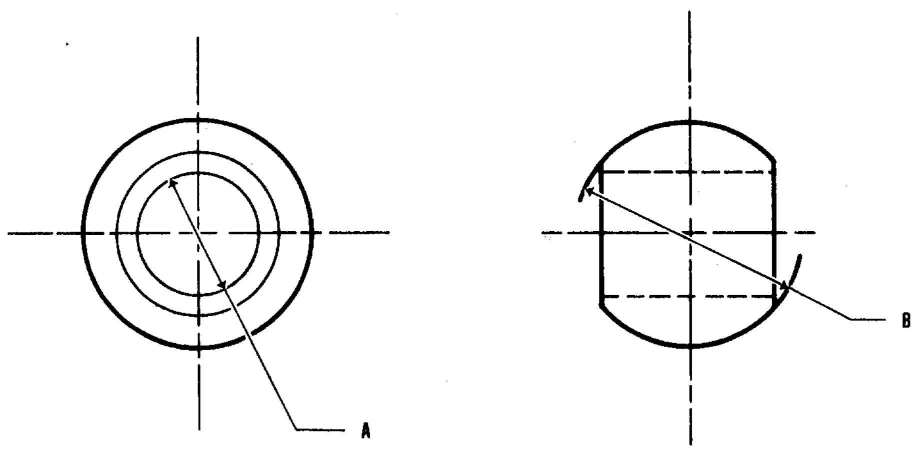
DESCRIPTION	PART NUMBER	DIA HOLE	MFG ALLOWANCE		MAX WEAR ALLOWANCE
			MIN	MAX	
BOGIE-DRIVE LINK	140-5441 140-5484	A B C	0.3144 0.3144 0.5045	0.3164 0.3164 0.5130	0.002 0.002 0.010
BOGIE TUBES	140-5412	A	0.4970	0.4995	0.002
OUTBD SUPPORT FTG.	140-5407 140-5439	A	0.5000	0.5035	0.006

S265-3-339

Wear Allowances — Thrust Reverser Drive Link Bogie,
Bogie Tubes, and Outboard Support Fittings —
Model NA 265-40, -60, -60A, -60SC and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 108



DOOR-DRIVE LINK



DRIVE LINK BEARING

WEAR ALLOWANCES

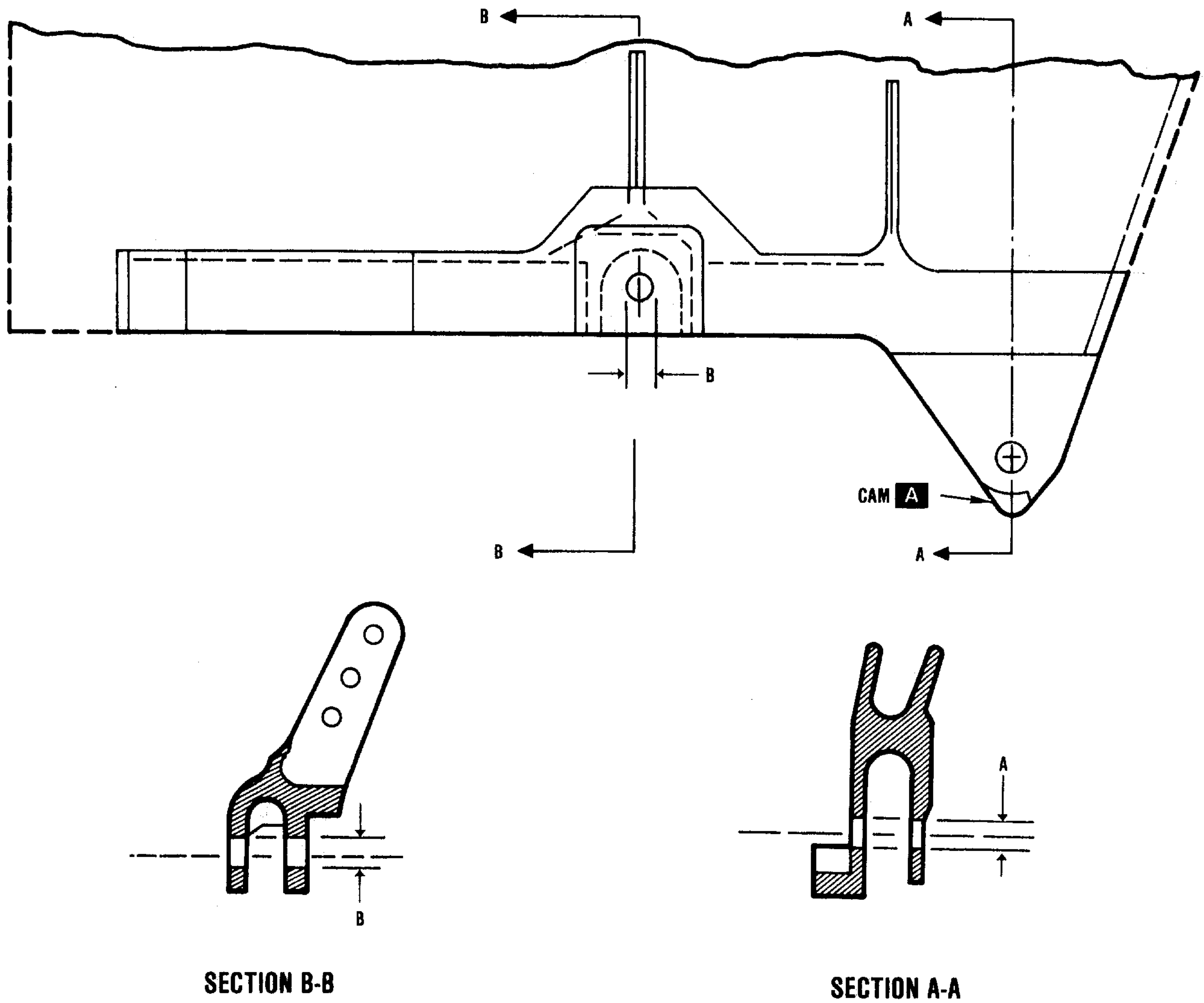
DESCRIPTION	PART NUMBER	DIA HOLE	MFG ALLOWANCE		MAX WEAR ALLOWANCE
			MIN	MAX	
DOOR-DRIVE LINK	140-5409	A	0.5935	0.5940	0.0005
DRIVE LINK BEARING	140-5410-1 140-5410-3	A	0.3120 0.3140	0.3125 0.3145	—— ——
	140-5410-1 140-5410-3	B	0.5920 0.5915	0.5930 0.5920	—— ——

NOTE

140-5410-3 BEARING MAY BE USED TO REPLACE 140-5410-1 BEARING
140-5410-1 BEARING MAY **NOT** BE USED TO REPLACE 140-5410-3 BEARING

S265-3-338

Wear Allowances — Thrust Reverser Deflector Door Drive Link and Drive Link Bearing — Model NA 265-40, -60, -60A, -60SC and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 104



WEAR ALLOWANCES

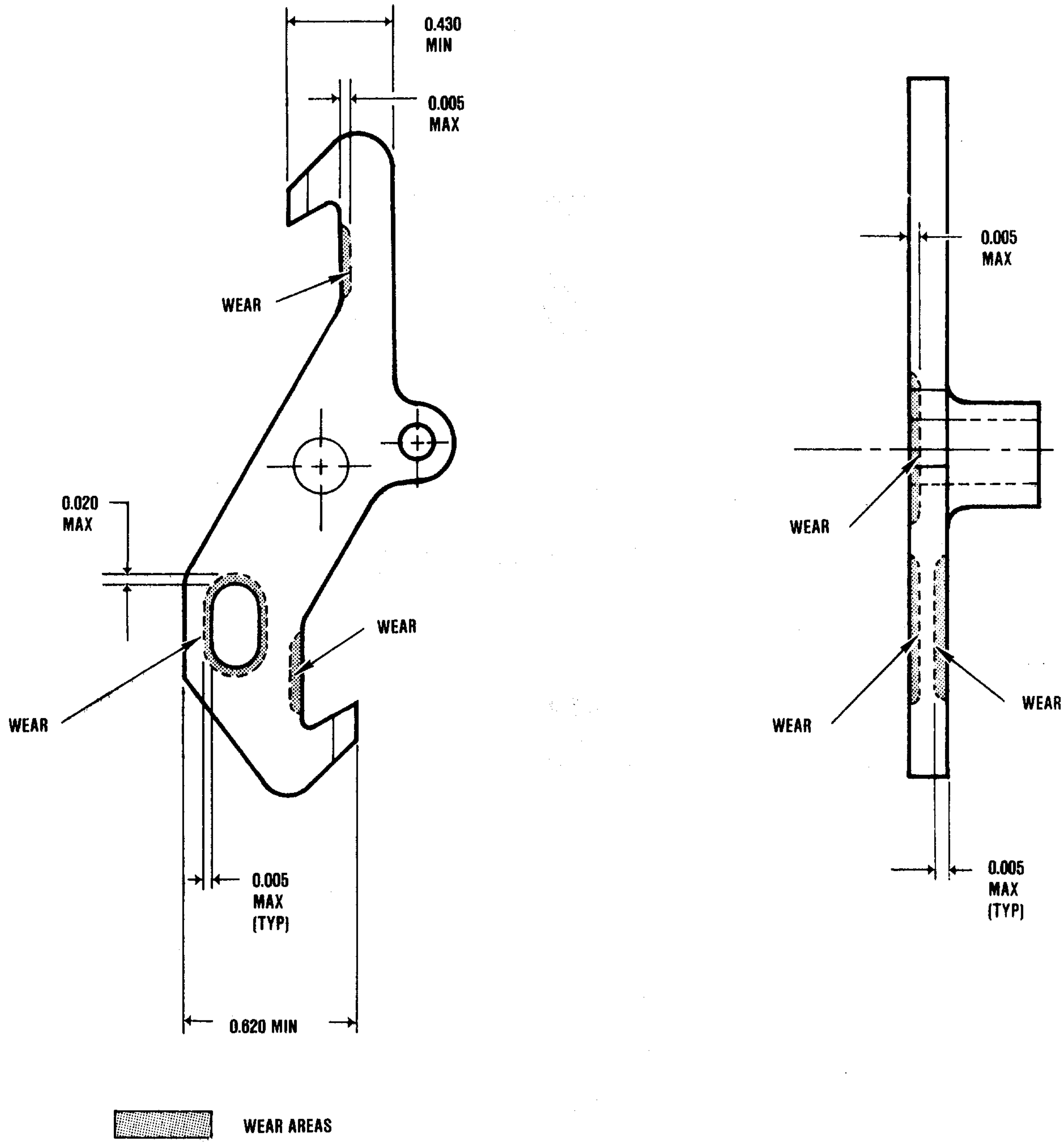
DESCRIPTION	PART NUMBER	DIA HOLE	MFG ALLOWANCE		MAX WEAR ALLOWANCE
			MIN	MAX	
UPPER DEFLECTOR DOOR LONGERON	140-5405	A	0.3125	0.3165	0.002
	140-5437	A	0.3134	0.3154	0.002
	140-5405	B	0.3125	0.3165	0.002
	140-5437	B	0.3134	0.3154	0.002
LOWER DEFLECTOR DOOR LONGERON	140-5406	A	0.3125	0.3165	0.002
	140-5438	A	0.3134	0.3154	0.002
	140-5406	B	0.3125	0.3165	0.002
	140-5438	B	0.3134	0.3154	0.002

NOTE

A MAXIMUM CAM WEAR NOT TO EXCEED 0.010 IN DEPTH.

S265-3-337

Wear Allowances — Thrust Reverser Upper and Lower Deflector Door Longerons — Model NA 265-40, -60, -60A, -60SC and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 105



NOTE

IF WEAR LIMITS ARE EXCEEDED, REMOVE DOOR LATCH HOOK AND REPAIR AS SHOWN IN FIGURE 202, 78-30-20 OR REPLACE WITH A NEW DOOR LATCH HOOK.

S265-3-334

Wear Limits — Thrust Reverser Door Latch Hook
Model NA 265-40, -60, -60A, -60SC and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 106

THRUST REVERSER

REPAIRS

GENERAL

This section contains repairs to the thrust reverser.

THRUST REVERSER DEFLECTOR DOORS CONTACT REQUIREMENTS — MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8, AND -9)

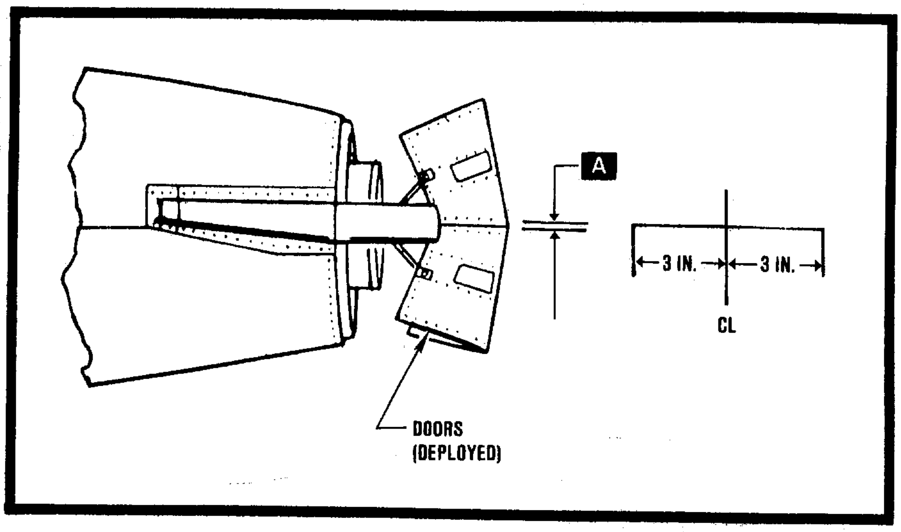
See figure 201 for methods of reworking deflector doors for proper door contact.

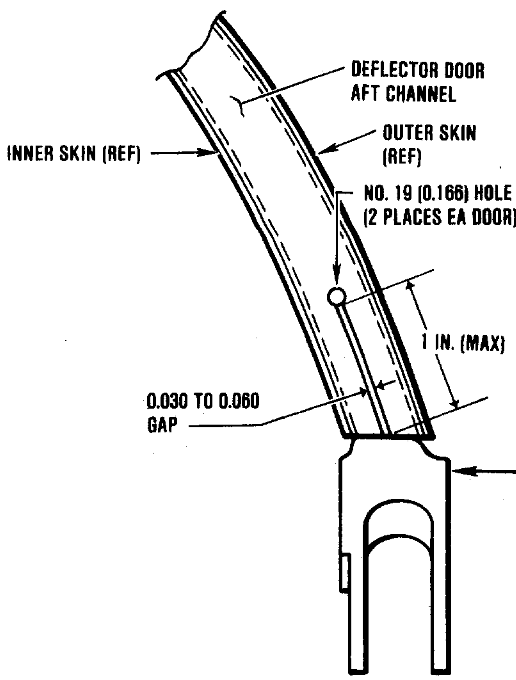
REPAIRS — MODEL NA 265-40, -60, -60A, -60SC, AND -70 (S/N 370-2 THRU -6, -8, AND -9)

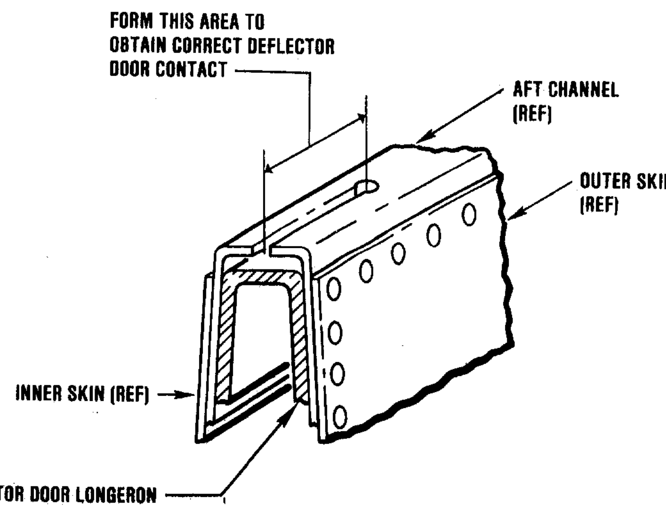
See figures 202 thru 210 for repairs to the thrust reverser and components.

THRUST REVERSER SUPPORT CRADLE NA 265-70, (S/N 370-1 THRU -7), -80, -80A, AND -80SC

See figure 211.







TO OBTAIN CORRECT CONTACT REQUIREMENTS BETWEEN AFT CHANNELS OF UPPER AND LOWER DEFLECTOR DOORS, FOLLOWING PROCEDURES SHOULD BE UTILIZED AS APPLICABLE.

(a) IT IS ACCEPTABLE TO LOCALLY GRIND AFT FACE OF DEFLECTOR DOOR AFT CHANNEL TO OBTAIN CORRECT CONTACT REQUIREMENTS. **DO NOT** REMOVE MORE THAN 0.033 IN. FROM FACE OF AFT CHANNEL. THICKNESS OF AFT CHANNEL IS 0.063 AND A MIN OF 0.030 MUST REMAIN AFTER GRINDING.

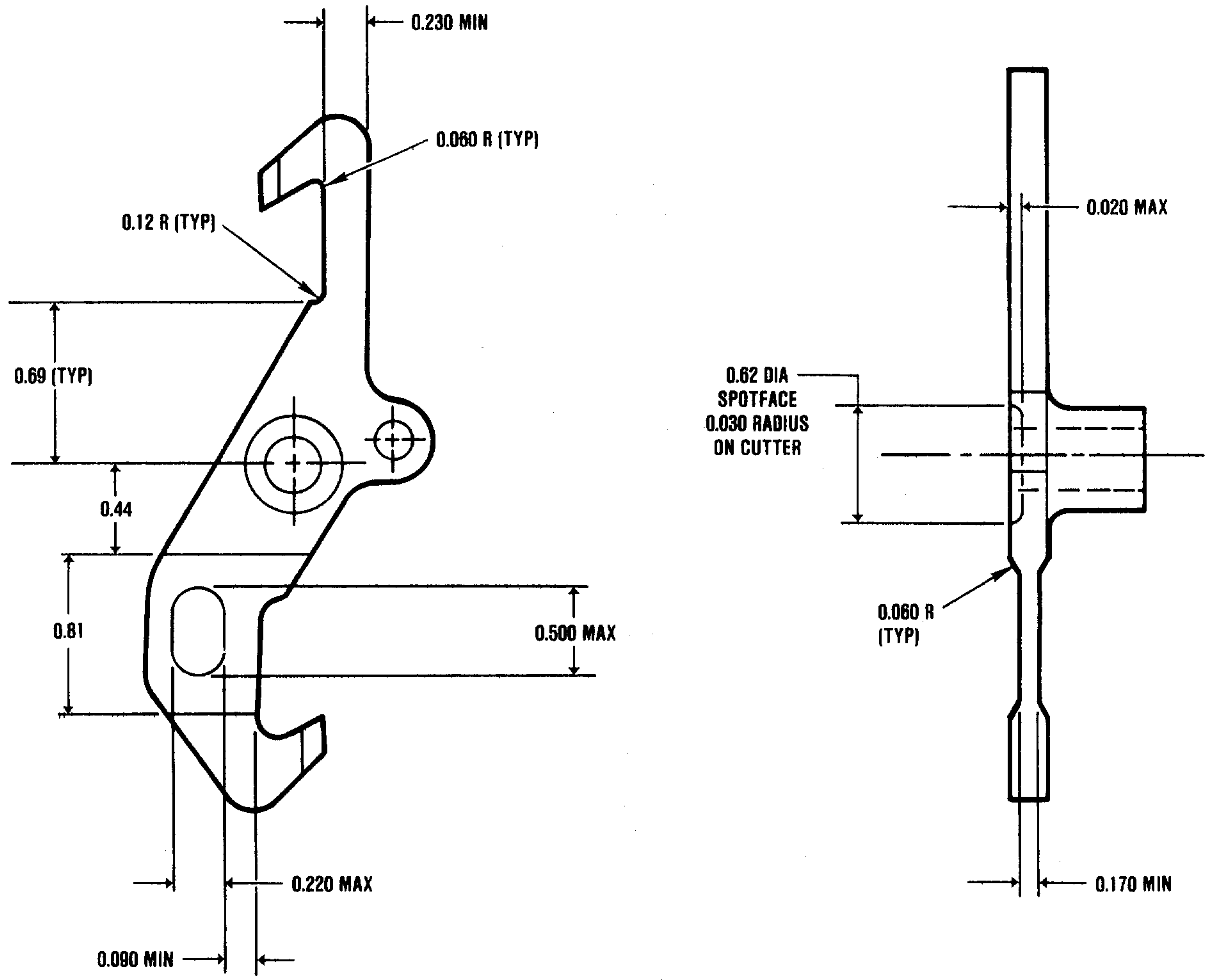
(b) OUTER ENDS OF DEFLECTOR DOOR AFT CHANNEL MAY BE REFORMED BY DRILLING A HOLE AND CUTTING A SLOT AS SHOWN IN ABOVE ILLUSTRATION. (SOME DEFLECTOR DOORS ALREADY HAVE HOLE AND SLOT IN THEM.) REFORM AFT CHANNEL TO CLOSE UP 0.030 TO 0.060 WIDE SLOT TO A ZERO IN. WIDTH SLOT.

NOTE

A 0.06 MAX IN. (DOORS DEPLOYED AND HYDRAULIC PRESSURE ON). PHYSICAL CONTACT MUST OCCUR AT CL OR SOMEPLACE WITHIN 3 IN. OF EITHER SIDE OF CL. MIN GAP OF 0.020 IN. MUST BE MAINTAINED FOR A DISTANCE OF 3 IN. ALONG TRAILING EDGE FROM OUTER ENDS OF DOORS.

S265-3-342

Thrust Reverser Deflector Door Rework to Provide Proper Contact Requirements — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 201

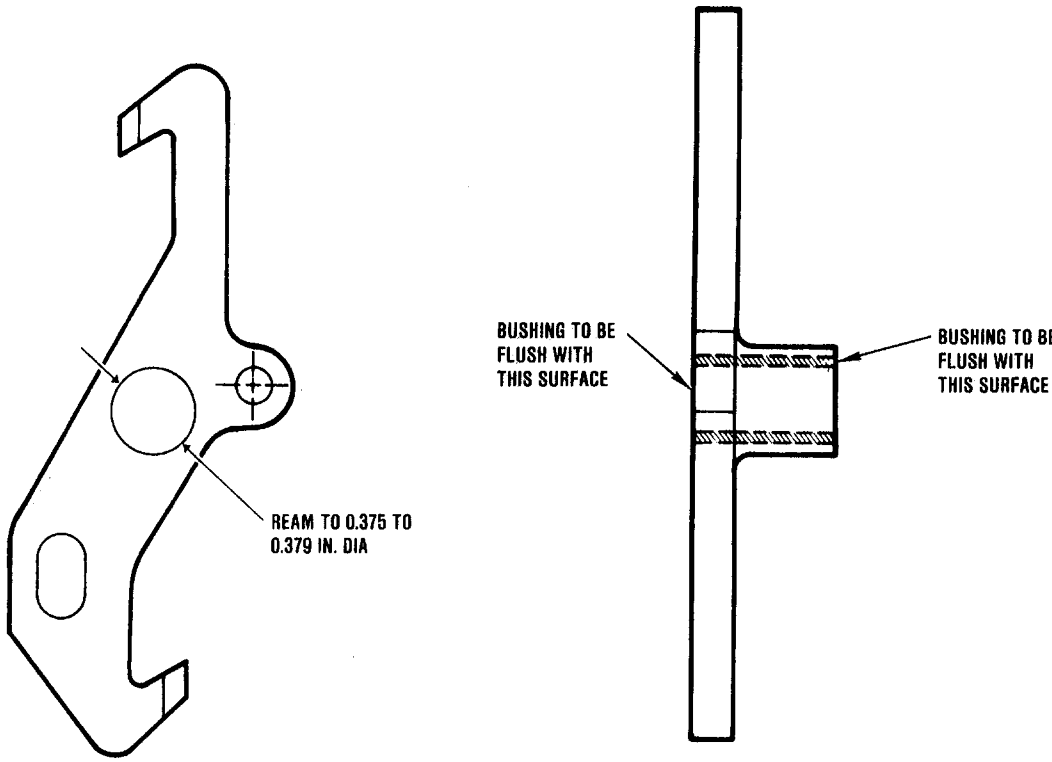


NOTES

- LIMITS SHOWN ARE MAX ALLOWABLE MACHINING DEPTHS. DO NOT MACHINE TO MAX DEPTH IF IT IS NOT NECESSARY.
- ALL MACHINED SURFACES TO BE 125 FINISH OR BETTER.
- IF DAMAGE EXCEEDS MAX ALLOWABLE MACHINING DEPTH, REPLACE DOOR LATCH HOOK.
- MACHINE DOOR LATCH HOOKS TO REMOVE WORN AREAS.

S265-3-341

Thrust Reverser Door Latch Hook — Wear Damage Repair — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9) Figure 202



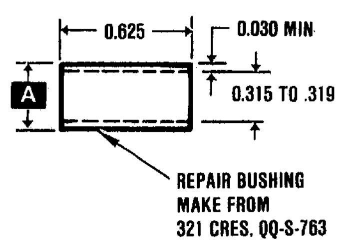
1 Ream oversize pivot hole in door latch hook to 0.375 to 0.379 in. dia.

2 Manufacture repair bushing from 321 CRES. Bushing must have an 0.001 to 0.0015 in. interference fit.

3 Coat repair bushing with zinc chromate primer, then press repair bushing into door latch hook while primer is still wet.

4 Machine repair bushing flush with both sides of door latch hook.

5 Ream repair bushing I.D. to required dimension.



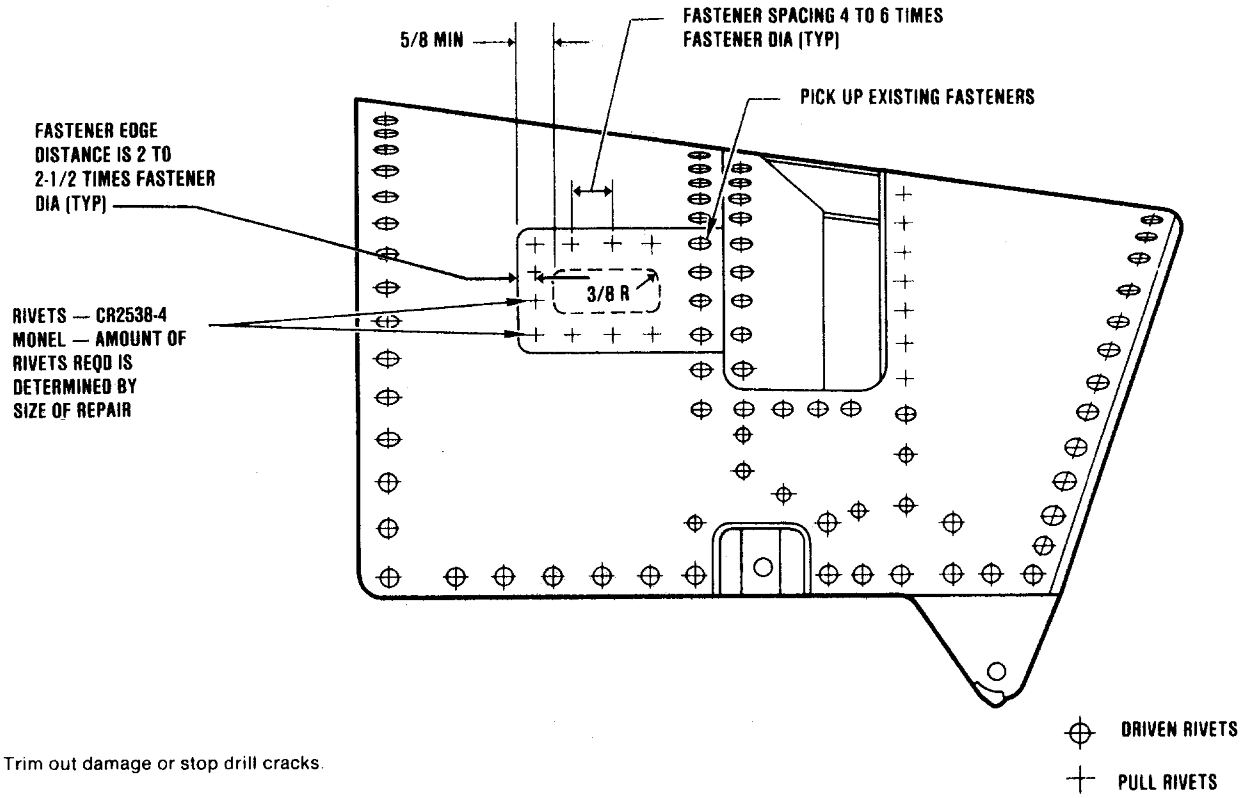
NOTES

- ALL MACHINED SURFACES ARE TO BE 32 OR BETTER.

A MACHINE O.D. OF BUSHING TO CREATE AN 0.001 TO 0.0015 IN. INTERFERENCE FIT BETWEEN BORE OF HOOK AND BUSHING O.D.

S265-3-340

**Thrust Reverser Door Latch Hook Bushing Installation,
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N -2 thru -6, -8, and -9)
Figure 203**



1 Trim out damage or stop drill cracks.

2 Smooth all edges and radius all corners of damage cutout.

3 Make repair doubler from 0.040 A286 CRES. Form repair doubler to match contour of outer skin at damaged area. Chamfer all edges of repair doubler.

4 Heat-treat repair doubler to a min of 140 KSI, then passivate repair doubler.

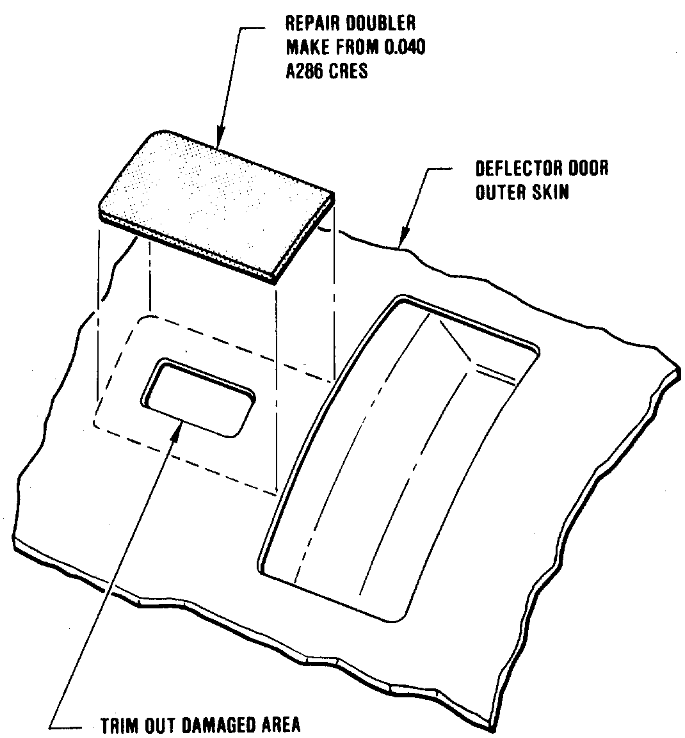
5 Layout and drill fastener pattern in repair doubler. Pick up existing fastener locations wherever possible.

6 Dimple repair doubler at existing fastener locations and counter sink repair doubler for 1/8 dia flush fasteners at all other fastener locations.

7 Install repair doubler using CR2538-4 blind monel pull rivets. When picking up existing fastener locations use CR2538 the same size as removed rivet.

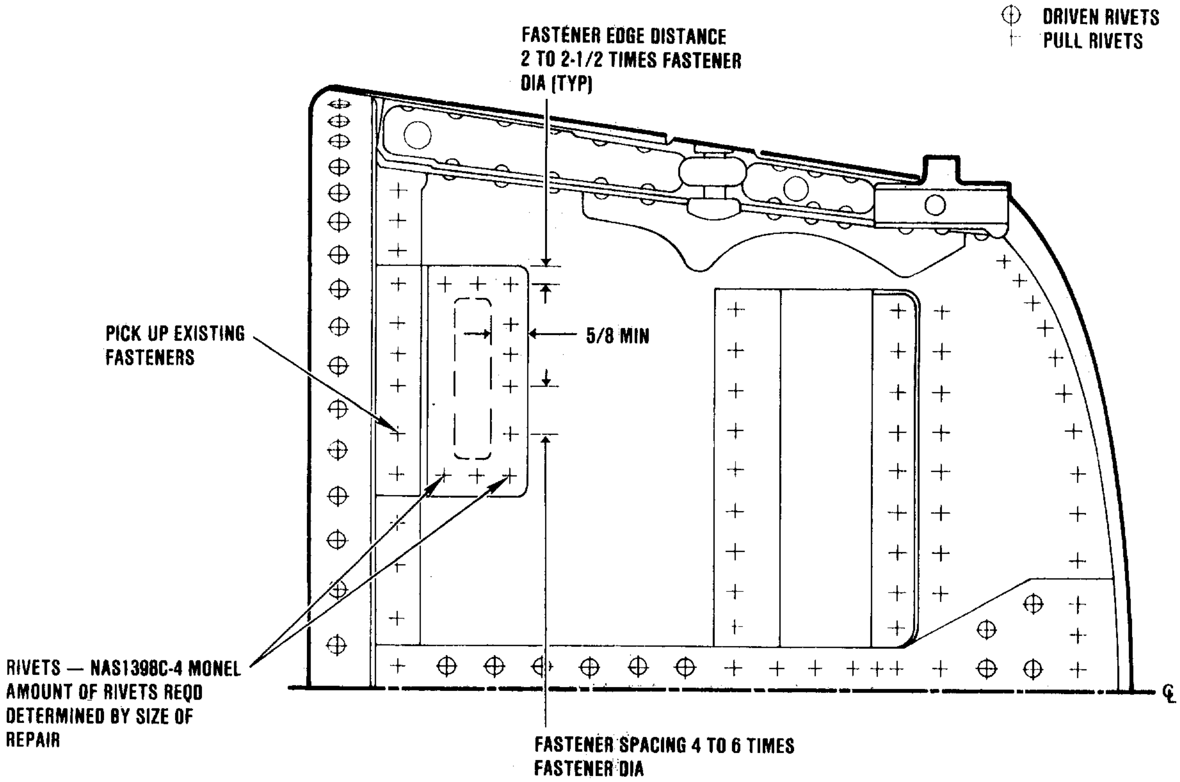
NOTE

THIS REPAIR MAY BE ADAPTED TO ANY AREA OF THE DEFLECTOR DOOR OUTER SKIN.



S265-3-343

Thrust Reverser Deflector Door — Outer Skin Repair— Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9) Figure 204



1 Trim out damage and/or stop drill all cracks.

2 Smooth all edges and radius all corners of damage cutout.

3 Make repair doubler from A286 CRES. Form repair doubler to match contour of deflector door inner skin. Joggle fwd end of repair doubler 0.032 by 5/8 in. Joggle run out to be 1/8 in.

4 Heat repair doubler to a min of 140 KSI, then passivate repair doubler.

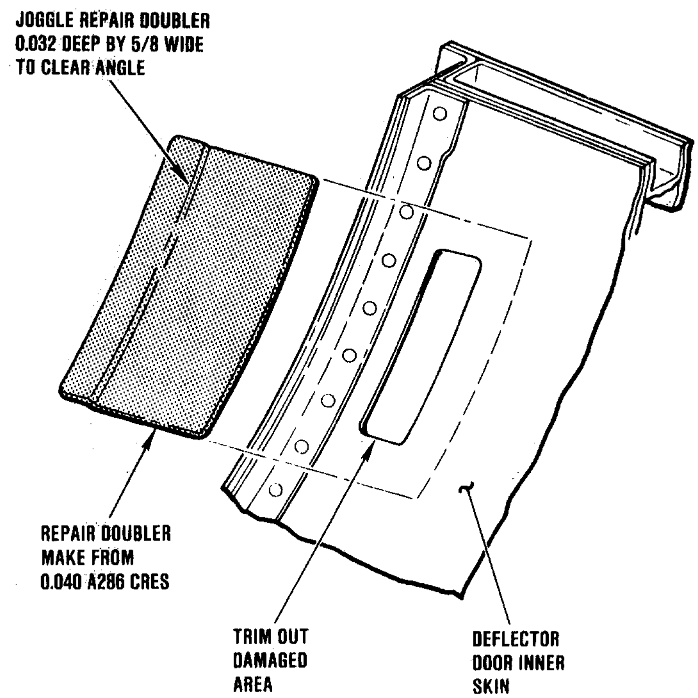
5 Layout and drill fastener pattern in repair doubler. Pick up existing fastener locations wherever possible.

6 Drill out existing fasteners that will be located under repair doubler.

7 Fasten repair doubler in place using NAS1398C-4 monel pull rivets at all new fastener locations. Install NAS1398C-5 monel pull rivets in all existing fastener locations.

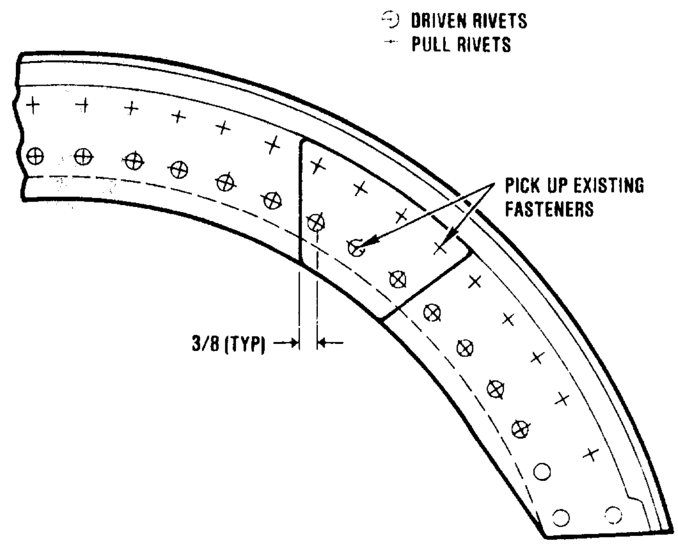
NOTE

THIS REPAIR MAY BE ADAPTED TO ANY AREA OF THE DEFLECTOR DOORS INNER SKIN BY EITHER OMITTING OR CHANGING JOGGLE LOCATION.



S265-3-344

Thrust Reverser Deflector Door — Inner Skin Repair —
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 205



1 Trim out damage (if practical midway between existing fasteners or stop drill all cracks as applicable.

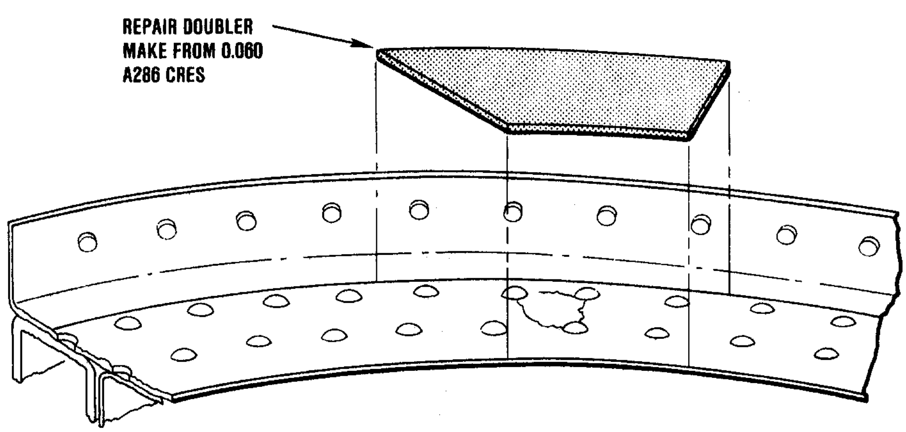
2 Make repair doubler from 0.060 A286 CRES material.

3 Heat-treat repair doubler to a min of 140 KSI, then passivate repair doubler.

4 Layout and drill fastener holes in repair doubler.

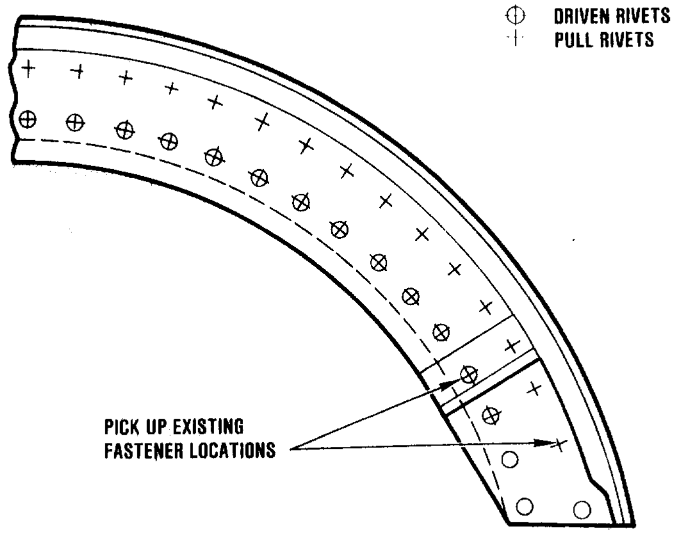
5 Chamfer all edges and radius all corners of repair doubler.

6 Install repair doubler using NAS1198-5 monel rivets or NAS1398C-5 monel pull rivets as applicable.



S265-3-345

Thrust Reverser Deflector Door — Forward Frame Repair —
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 206



1 Remove three screws securing latch to deflector door.

2 Drill out existing fasteners in damaged area, then trim out damage midway between existing fasteners and/or stop drill all cracks as required.

3 Make repair doubler from A286 CRES material. Joggle repair doubler.

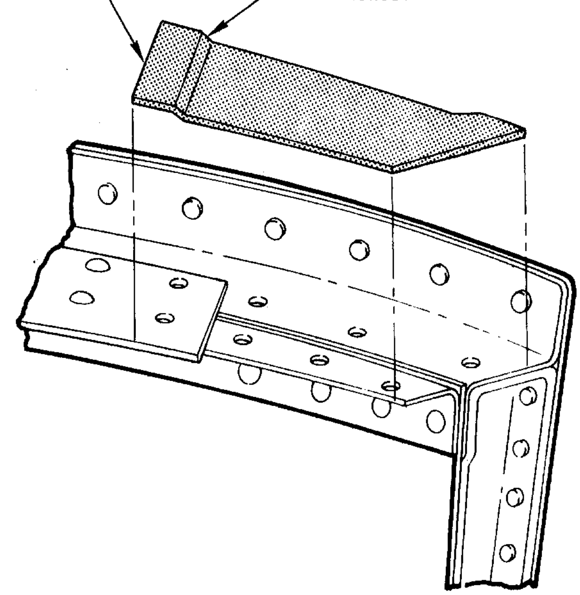
4 Heat-treat repair doubler to a min of 140 KSI then passivate repair doubler.

5 Layout and drill fastener holes in repair doubler. Do not drill holes for screws securing latch to end plate.

6 Fasten repair doubler in place using same size, type and dia of fasteners as removed.

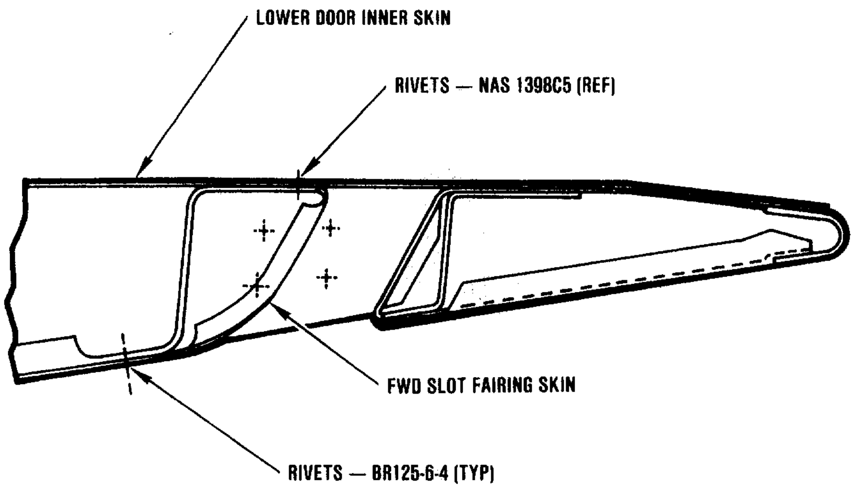
7 Carefully back drill 3 places, through existing latch attach holes in deflector door structure to drill latch attach holes in repair doubler.

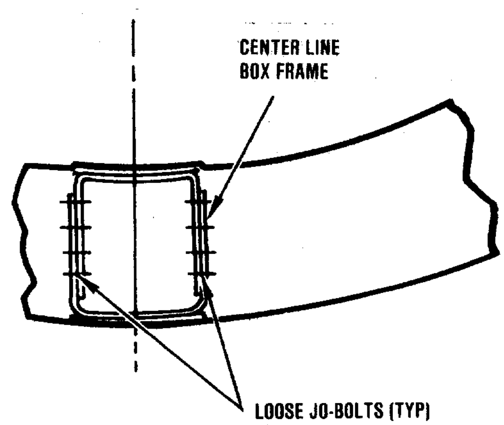
8 Install door latch using removed hardware.



S265-3-346

Thrust Reverser Deflector Door Forward Frame End Repair
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 207





1 Carefully, so not to enlarge fastener hole, drill out single row of eight (NAS 1398C5) rivets on lower door inner contoured surface attaching fwd slot fairing skin.

2 Carefully, so not to enlarge fastener hole, drill out single row of ten (BR125-6-4) rivets on lower door inner contoured surface attaching fwd slot fairing skin.

3 Remove fwd slot fairing skin.

4 Drill out loose Jo-Bolt(s) (P-164A-1) in the group of four located on each side of center line box frame.

5 Re-drill Jo-Bolt hole to .199/.202 in. dia.

6 Install new Jo-Bolt(s) (PP220A-2) using one washer (AN960C10L) under Jo-Bolt head for suitable grip.

7 Install Jo-Bolt in accordance with instructions in 51-40-30, fig 2.

8 Place fwd slot fairing skin in position.

9 Install 8 (NAS 1398C5) rivets in lower door inner contour surface attaching fwd slot fairing skin.

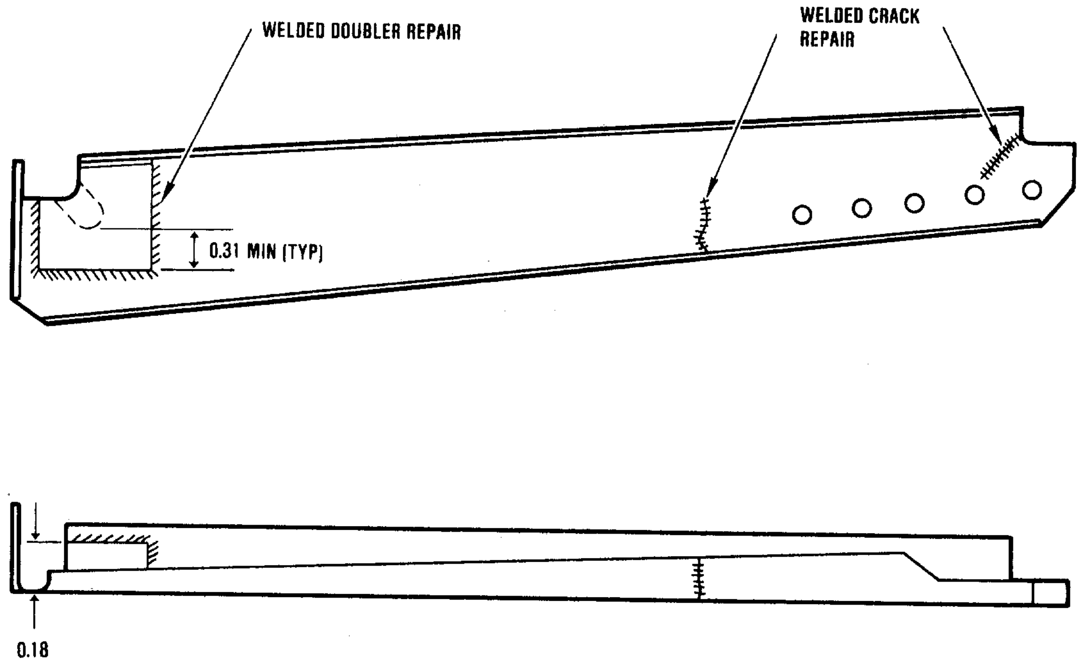
10 Install 10 (CR2538-4) rivets in lower door outer contour surface.

NOTES

- THIS REPAIR PROCEDURE IS APPLICABLE TO LOOSE JO-BOLT(S) ON EITHER SIDE OF CENTER LINE BOX FRAME.
- WASHER MAY BE DRILLED OUT (13/64 IN. DRILL FOR SLIP FIT OVER JO-BOLT SHANK.

S265-3-347

Thrust Reverser Lower Deflector Door Loose Jo-Bolt Repair — Model NA 265-40, -60, -60A, -60SC, and -70 (S/N 370-2 thru -6, -8, and -9)
Figure 208



140-5401-35, -37, -47 AND -48 SUPPORT CHANNELS

1 WELDED DOUBLER REPAIR

(a) Grind out damage maintaining a 0.16 in. radius in damage removal area.

(b) Fabricate repair doubler from Hasteloy X material, the same gauge as damaged channel. Refer to chart for material gauge.

(c) Weld doubler in place using Heliarc inert arc process and Hasteloy "W" rod. Weld should extend completely around repair doubler.

2 WELDED CRACK REPAIR

NOTE

CRACKS MAY BE WELDED TO A MAX LENGTH OF 50% OF WEB WIDTH OR EXTEND OVER 2 IN. IN LENGTH IN THE SPANWISE DIRECTION.

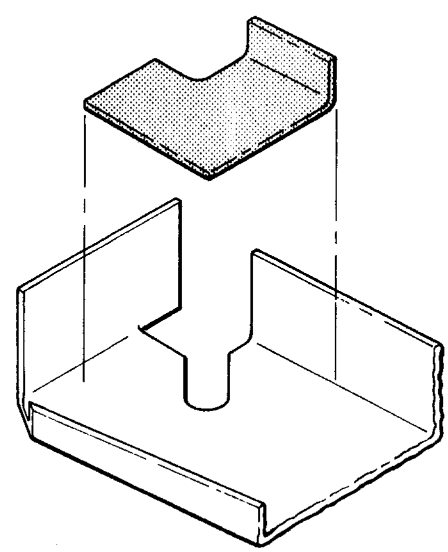
(a) Stop drill crack with a No. 40 (0.098) drill.

(b) Weld crack using Heliarc inert arc process and Hasteloy "W" rod. Weld bead must extend 1/8 in. beyond stopdrilled hole.

(c) Dye penetrant inspect repair to insure repair is complete.

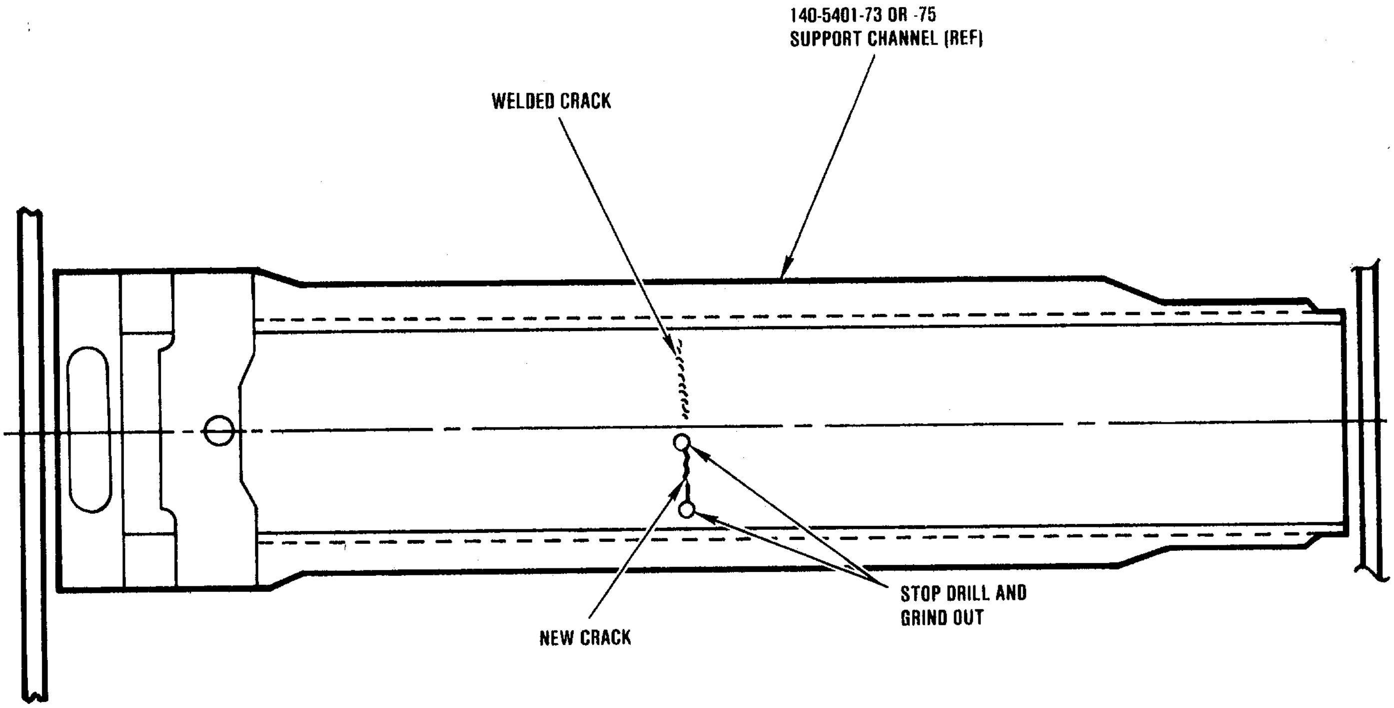
NOTE

DAMAGED CHANNELS MAY BE REPAIRED BY EITHER A WELDED DOUBLER OR BY WELDING CRACKS.



S265-3-328

Thrust Reverser Support Channel Repair (140-5401-35, -37, -47, and -48) —
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 209



140-5401-73 OR -75 SUPPORT CHANNELS

PREPARATION

NOTE

IF DAMAGE IS LOCATED ON OUTBD CHANNEL ASSEMBLY, ACCOMPLISH THE PREPARATION PROCEDURES IN STEP A. IF DAMAGE IS LOCATED ON INBD CHANNEL ASSEMBLY, ACCOMPLISH PREPARATION PROCEDURES IN STEP B.

(a) If damage is on outbd channel assembly, remove thrust reverser actuator from channel assembly; then drill out rivets securing insulation blanket to channel. Remove insulation blanket to expose damaged area.

(b) If damage is on inbd channel assembly; remove three clamps securing wire harness to support channel and secure wire harness so that it will not interfere with repair procedures.

REPAIR PROCEDURE

NOTE

OUTBD CHANNELS ARE FORMED FROM 0.063 INCONEL SHEET. AND INBD REPAIR CHANNELS ARE FORMED FROM 0.050 INCONEL SHEET.

1 Stop drill each end of crack with a number 40 (0.098) drill.

2 Vee grind out crack.

3 Dye penetrant inspect crack area prior to welding crack.

4 Position a thin piece of stainless steel sheet stock between channel assembly and nozzle to act as a heat shield to protect nozzle.

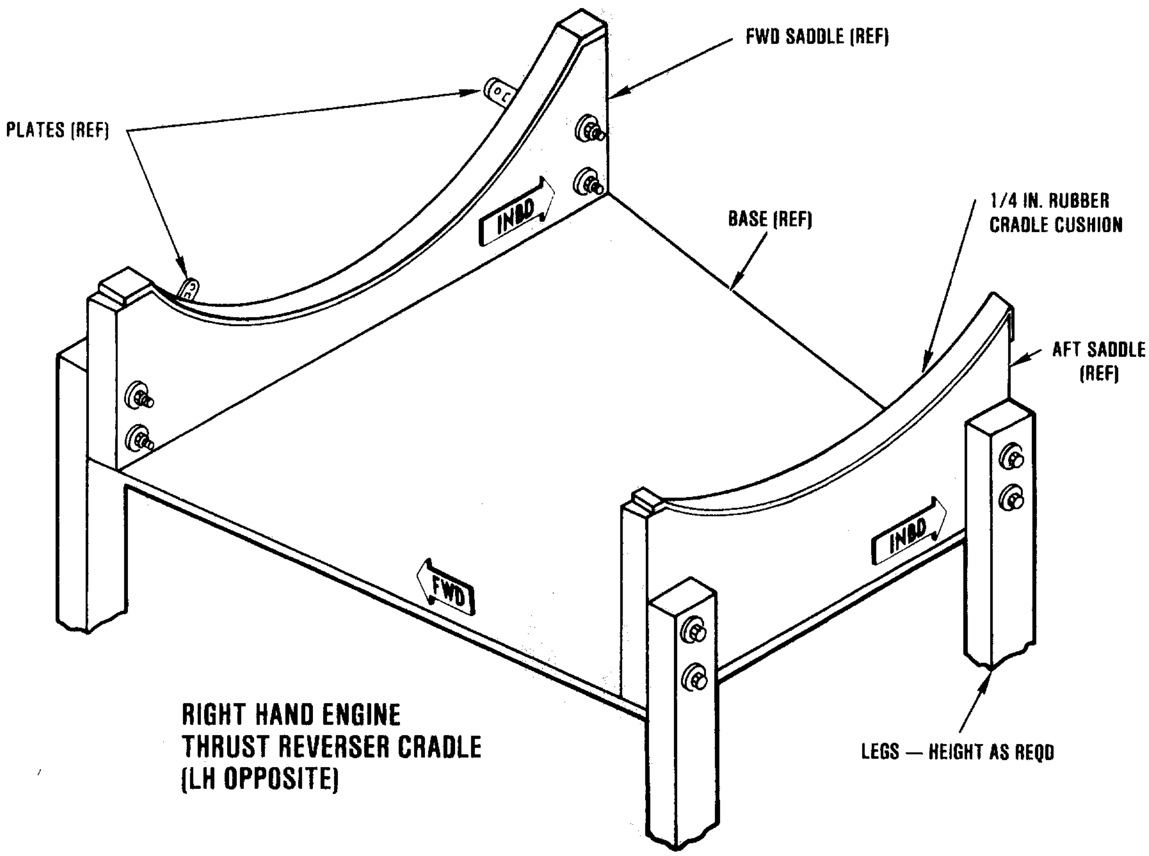
5 Weld cracks using Heliarc inert arc process. Weld bead should extend at least 1/8 in. beyond stop drilled holes at each end of crack.

6 Dye penetrant inspect completed weld to make certain that all cracks have been completely welded.

7 Reinstall all removed components

S265-3-349

Thrust Reverser Support Channel Repair (140-5401-73 and -75) —
Model NA 265-40, -60, -60A, -60SC, and -70
(S/N 370-2 thru -6, -8, and -9)
Figure 210



To fabricate either LH or RH aft fairing/thrust reverser cradle, proceed as follows:

1 Layout and fabricate cradle base, fwd and aft cradles, and plates using dimensions and materials called out on sheet 2.

2 Secure fwd and aft cradle base using wood screws or lag screws.

3 Attach legs to fwd and aft cradles to obtain desired height. Secure legs to cradles with bolts or lag screws.

4 Cement 1/4 in. thick by 2 in. wide strips of sheet rubber on cradle surfaces to cushion aft fairing/thrust reverser assembly.

5 Position aft fairing/thrust reverser assembly in cradle so that fwd edge of aft fairing is even with fwd edge of fwd cradle. Place aluminum plates over catches on fwd end of aft fairing. Secure plates to aft fairing with 1/4 in. bolt through plates into catch.

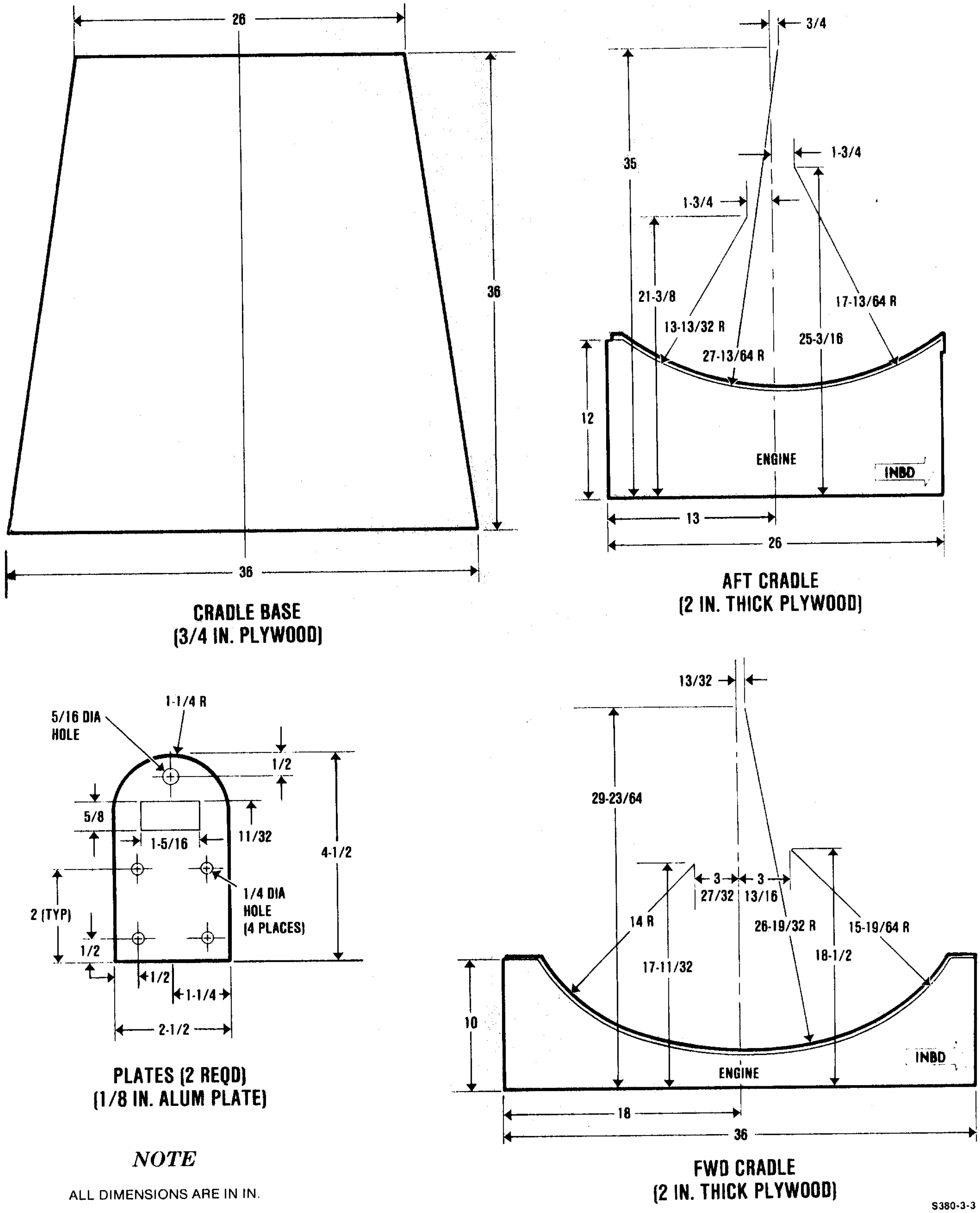
6 Secure plates to fwd cradle with 1/4 in. lag screws.

NOTE

TO REMOVE AFT FAIRING/THRUST REVERSER FROM CRADLE, REMOVE TWO 1/4 IN. DIA BOLTS THROUGH ALUMINUM PLATES AND INTO CATCHES, THEN REMOVE ASSEMBLY FROM CRADLE.

S380-3-2

Thrust Reverser Support Cradle —
Model NA 265-70, (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 211 (Sheet 1 of 2)



Thrust Reverser Support Cradle —
Model NA 265-70, (S/N 370-1 and -7), -80, -80A, and -80SC
Figure 211 (Sheet 2 of 2)